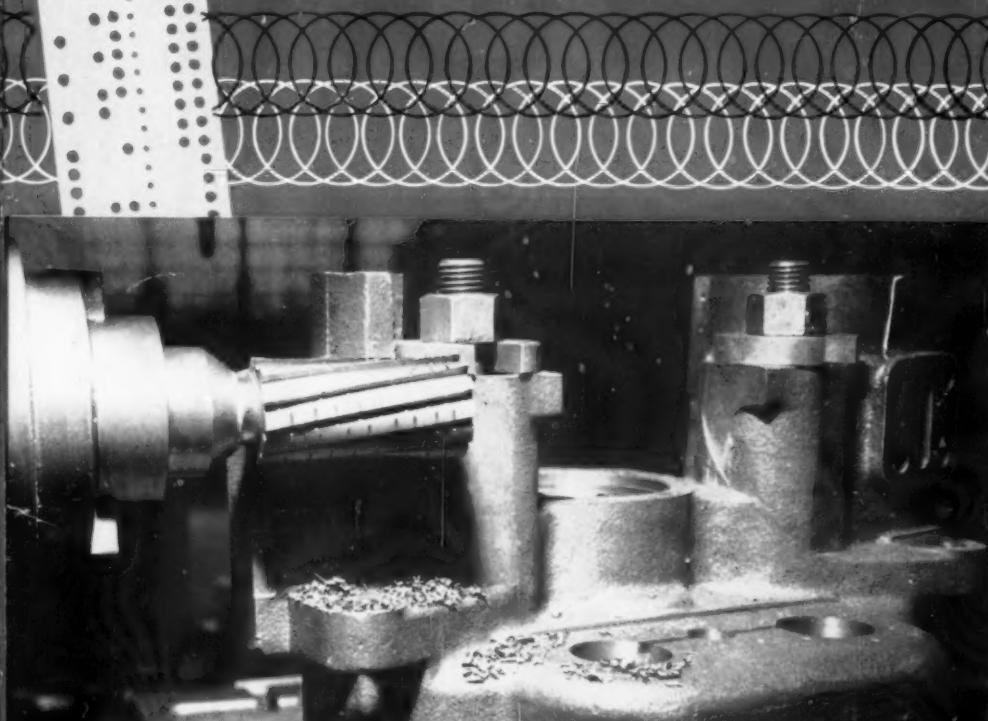


january

1958

MACHINE AND TOOL

blue book



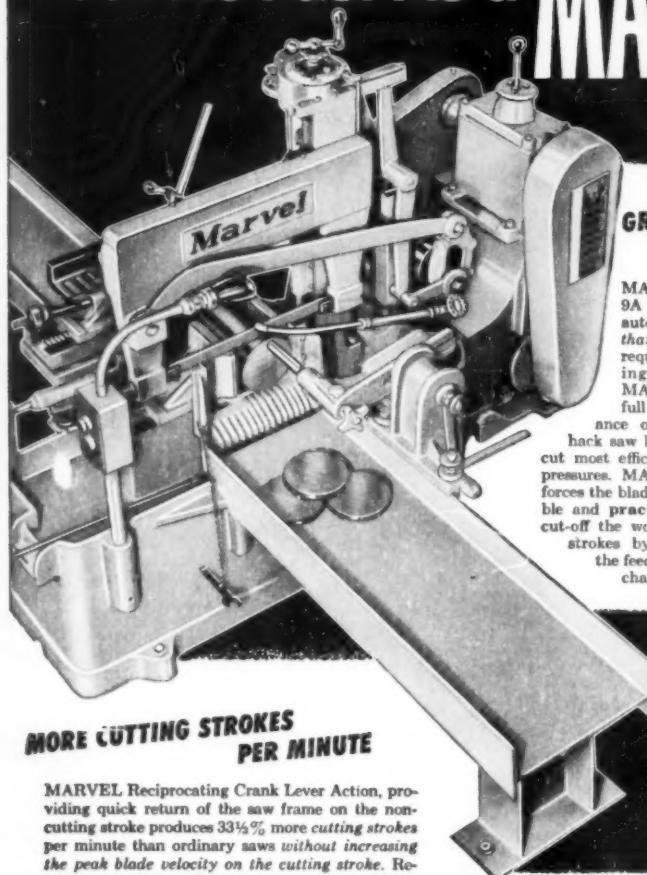
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Numerical vs. Tracer Control page 114

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How Can Any Hack Saw Cut As Fast As a MARVEL?



MORE CUTTING STROKES PER MINUTE

MARVEL Reciprocating Crank Lever Action, providing quick return of the saw frame on the non-cutting stroke produces 33½% more cutting strokes per minute than ordinary saws without increasing the peak blade velocity on the cutting stroke. Result: faster cutting-off without damage to the blade.

With far greater feed pressures automatically available, plus more cutting strokes per minute, is it any wonder that MARVEL Series 6 and 9 Hack Saws will give you faster, accurate cutting-off every time?

GREATER EFFECTIVE FEED PRESSURE

MARVEL Series 6, 6A, 9 and 9A Hack Saws are capable of automatically applying more than twice the feed pressure required for most hack sawing jobs. This means that MARVEL Saws can utilize the full strength and heat resistance of the modern composite

hack saw blade which is designed to cut most efficiently under heavier feed pressures. MARVEL Dual Power Feed forces the blade to cut as deeply as possible and practical on every stroke—to cut-off the work in the fewest possible strokes by automatically adjusting the feed pressure in relation to the changing work resistance.

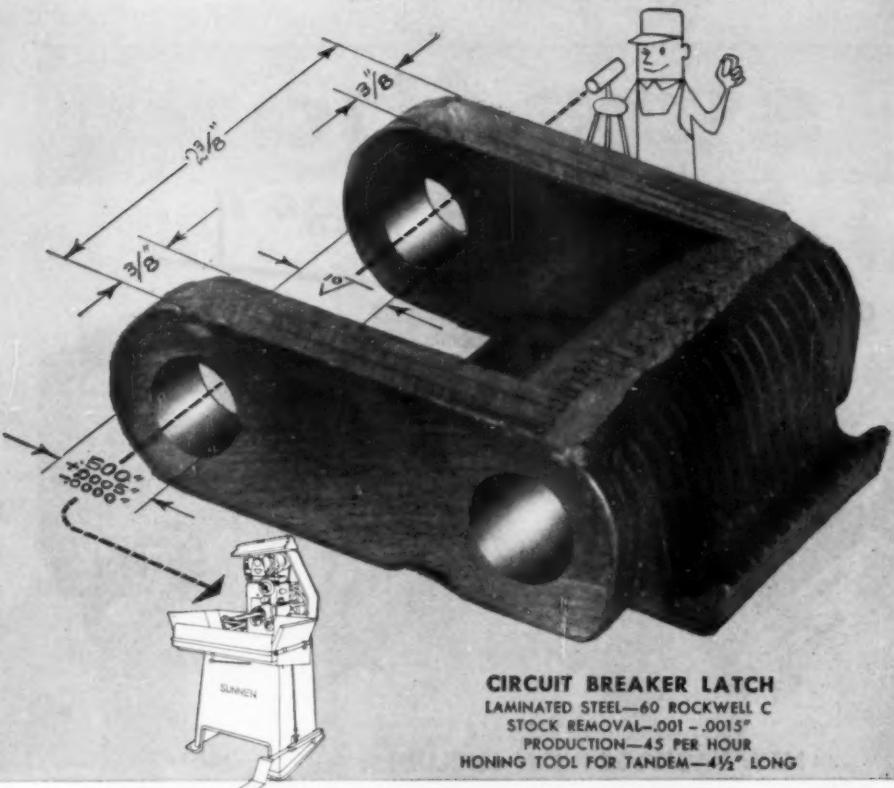
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and the complete
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SAWS
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HONING TOOL FOR TANDEM— $4\frac{1}{2}$ " LONG

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Tandem bores are often a problem: Boring or grinding from one side requires a long quill or bar which tends to spring, jump and chatter.

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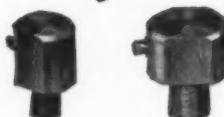
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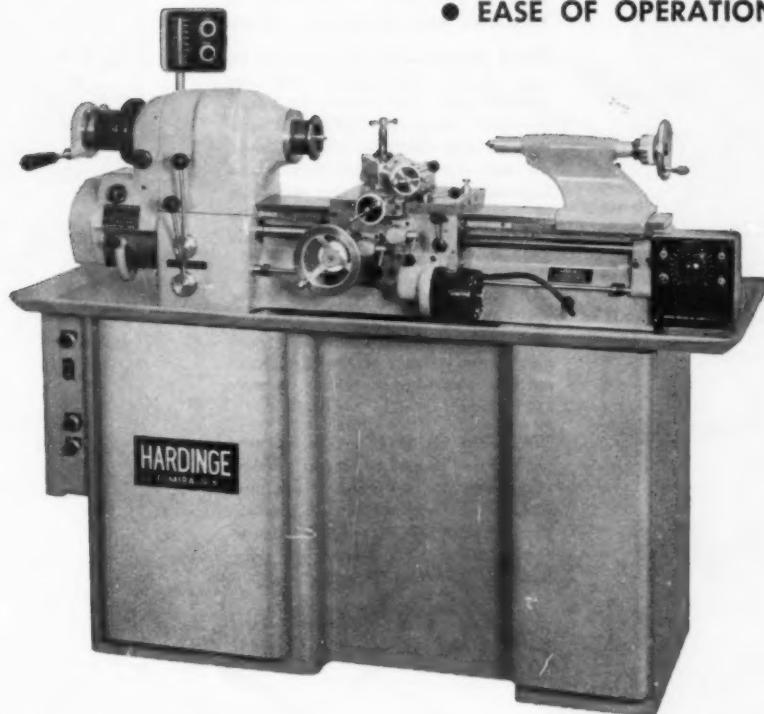
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Reader's Guide



JANUARY, 1958

VOL. 53 - No. 1

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CINCINNATI No. 2MI Plain
Milling Machine, equipped
with an Independent Over-
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tails in catalog No. M-1995.
Brief specs in Sweet's Ma-
chine Tool File.

These drawings illustrate how CINCINNATI Independent Overhead Spindles increase the range and versatility of CINCINNATI knee-type milling machines.

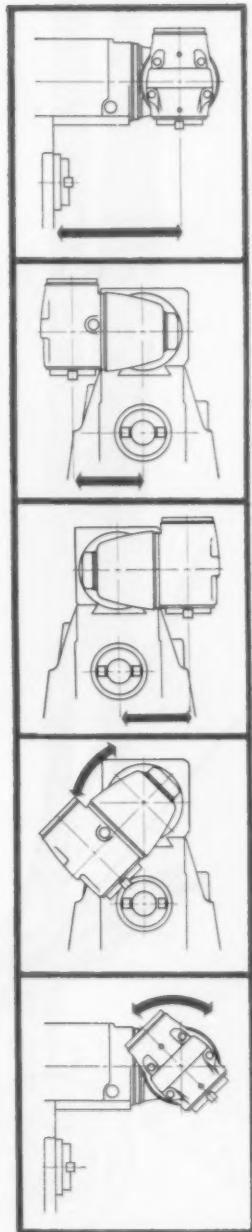
OVERHEAD SPINDLE

How many times have you needed a little extra range or extra versatility for a milling setup? Just think how much it would have saved! You can get all the extra range and versatility you will need on your CINCINNATI® knee-type milling machines by equipping them with Independent Overhead Spindles. Consider the CINCINNATI No. 2MI, for example. Of itself, it offers a host of advantages: convenient and easy speed and feed changes . . . automatic backlash eliminator . . . unit construction. To these advantages and many others, add the extra range and versatility offered by the Independent Overhead Spindle, and you have a toolroom miller that can handle any job. A few examples of the ways in which these overarm mounted spindle heads increase the job possibilities of CINCINNATI Milling Machines are illustrated here. There are three sizes: 2 hp with manual speed selection for 2ML and 2MI; 3 hp with electrical speed selection for 2ML, 2MI and Dial Types; 5 hp with electrical speed selection for Dial Types and High Power and Dual Power Dial Types. You may obtain more information by writing for publication No. M-1963-1 (2 hp unit) or M-1925-3 (3 hp and 5 hp unit).

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CINCINNATI 9, OHIO

CINCINNATI

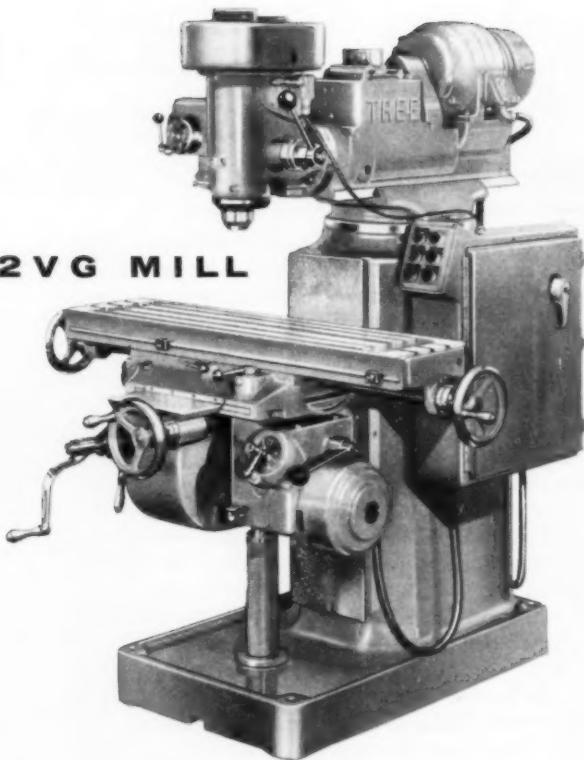
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12 GEARED SPEEDS

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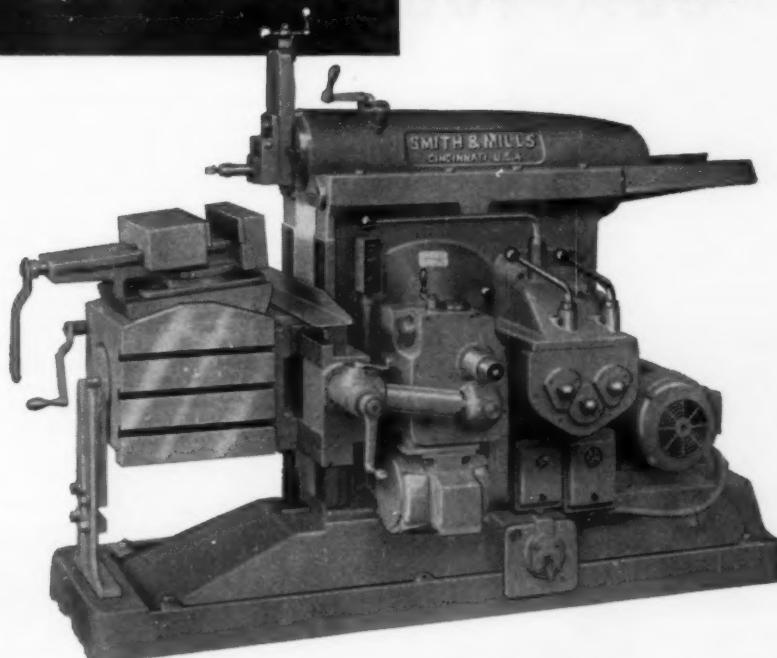


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SHAPERS

Smith & Mills



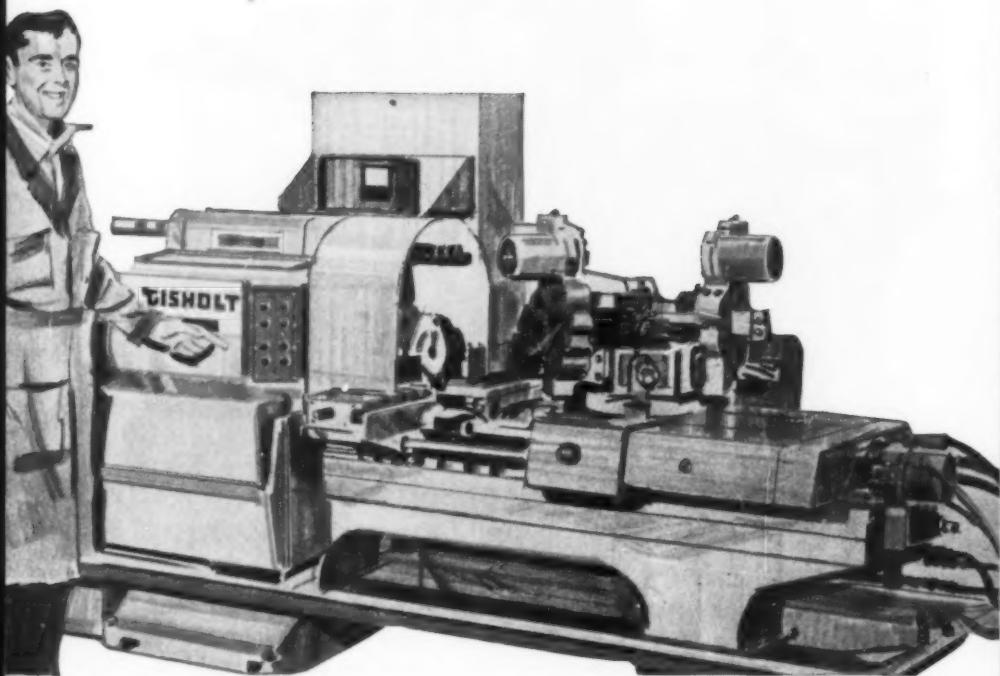
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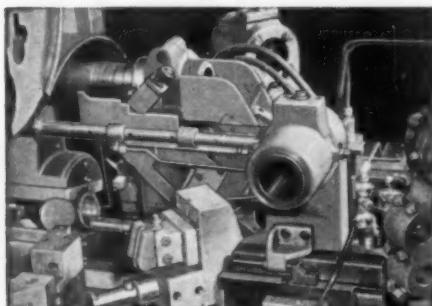
50% OR MORE

BY SIMPLY FLIPPING TOGGLE SWITCHES, your operators can cut setup time 50% or more with this electric control panel—one of the many advanced features available on the new Gisholt MASTER-LINE Fastermatic Automatic Turret Lathe.

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What does this Fastermatic versatility mean to you? It means more time cutting chips, more profit per piece, less skill required of the operator, and freedom to handle additional units or do other work during machining cycles. It means you can utilize smart tooling and eliminate human errors...get record production on long runs...and also get the advantage of automatic cycle operation on relatively short runs.

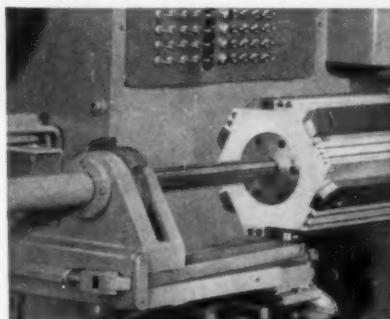
Ask your Gisholt Representative to tell you more about the new Fastermatic. Call him today—or write Gisholt for Bulletin No. 1179.



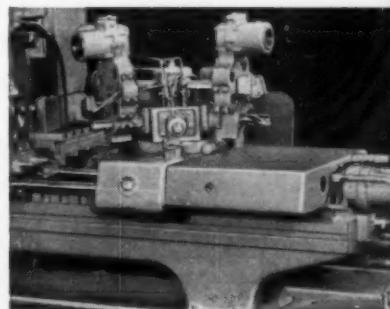
GISHOLT JETracer—mounts on any one of Fastermatic's turret stations. Provides exceptional accuracy for turning, boring or facing—either straight, taper or contour. Hydraulically operated; stylus follows contour of template controlling movement of single-point tool on sliding member.



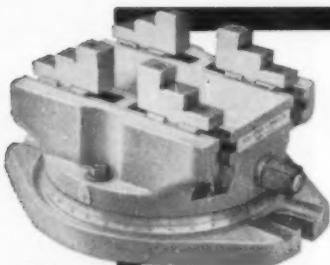
ELECTRIC SETUP CONTROL PANEL—toggle switches govern basic machine functions, cut setup time in half. Master reference card cuts setup time still more on reruns.



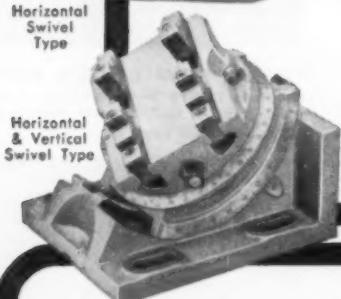
HEXAGON FEED CONTROL DRUM—positioning adjustable flat bars on each face determine rate of feed. Thumbscrew actuator pins in slots on each face determine point of change from traverse to feed and length of feed.



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Swivel
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Horizontal
& Vertical
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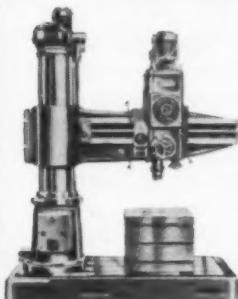
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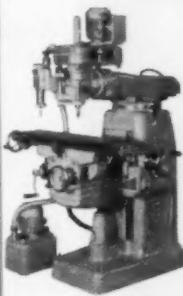
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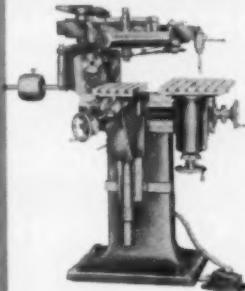
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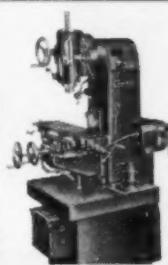


Model P — 31/46
Swing over ways 31";
Swing in gap 46"
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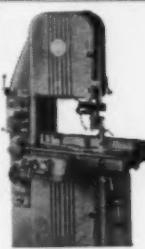


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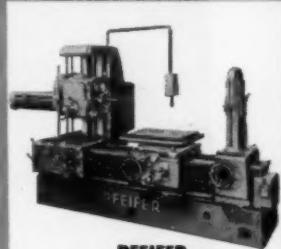
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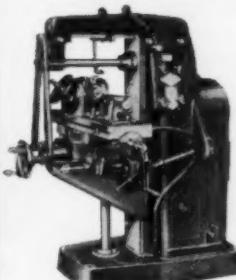


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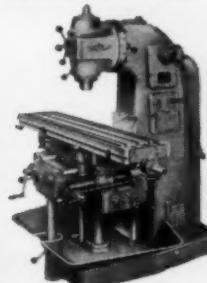


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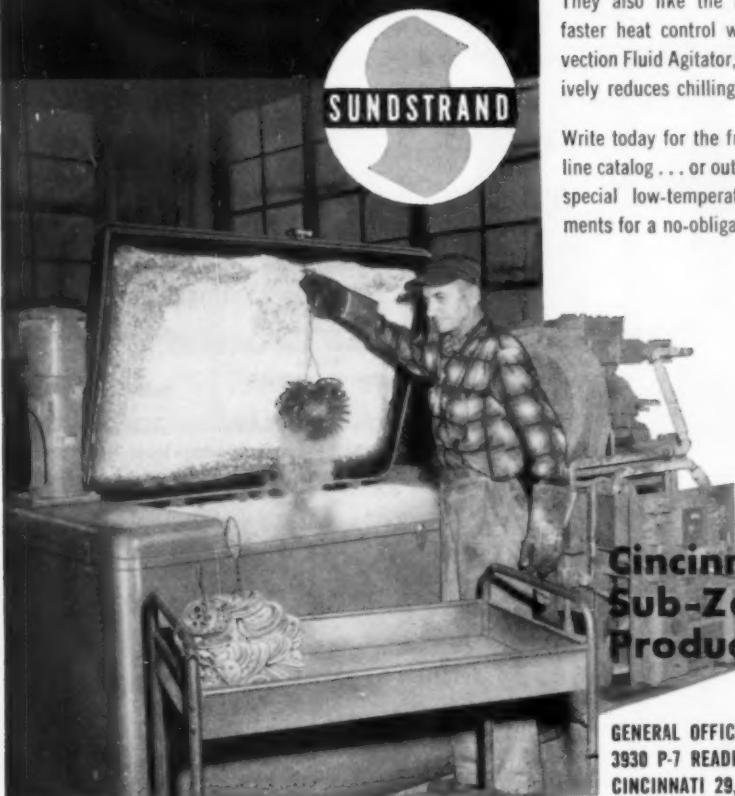
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MACHINE and TOOL BLUE BOOK



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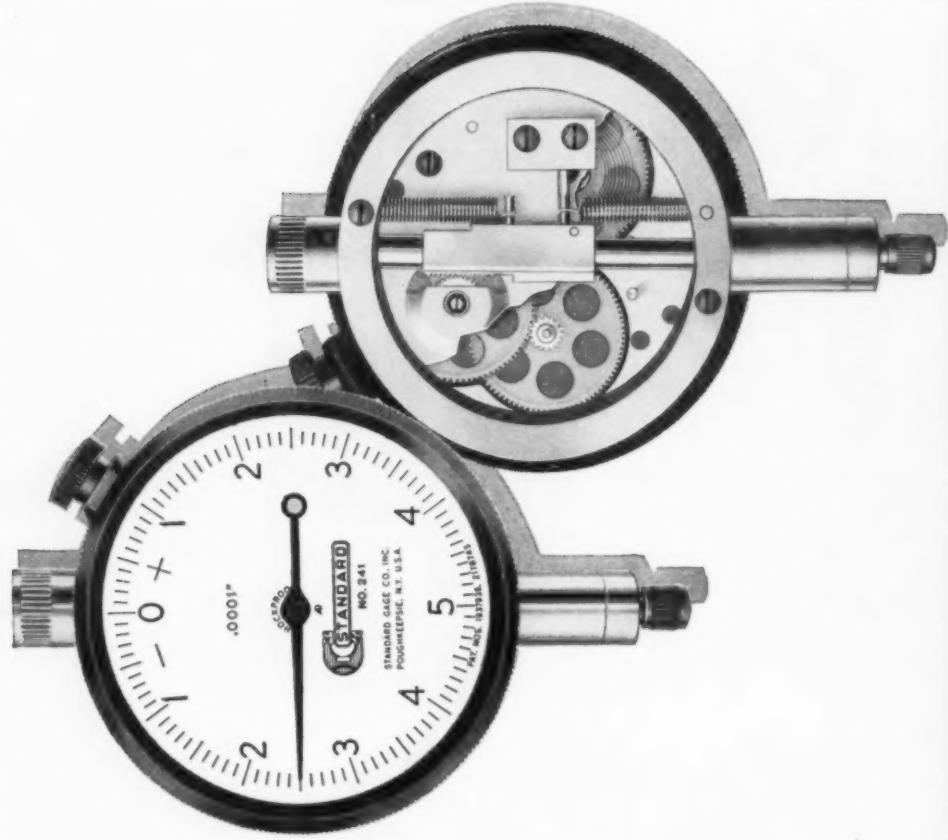
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COMPARATIVE ANALYSIS OF SEVEN ESSENTIAL INDICATOR COMPONENTS

COMPARATIVE ANALYSIS OF SEVEN ESSENTIAL INDICATOR COMPONENTS

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PIVOT HARDNESS

PINION TEETH HARDNESS

SPINDLE HARDNESS

INDICATES HIGHEST RATING
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MAKE A	RC 25	RC 55	RC 55	No	No	No	No
MAKE B	RC 25	RC 25	RC 25	No	No	No	No
MAKE C	RC 43	RC 43	RC 43	YES	YES	YES	No

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that 1 wheel
could**

Jim Frederick's eleven years of experience as an abrasive engineer have covered most of the problems in the book. That's why he so often finds practical solutions when he runs into problems that are *not* in the book.

Steelcraft operator
John Kulpa checks
performance of new Bay
State wheel on high speed
steel form tool job.



outperform 3 at Steelcraft Tool Co.

Steelcraft Tool Co., of Detroit, used to use three different grinding wheels to rough and finish the angles on straight high speed steel form tools . . . one specification for roughing, two for finishing. Then Bay State came into the picture through distributor Jim Frederick of Detroit's Industrial Abrasives Co. He showed them how a single Bay State wheel specification would cut *fast* for roughing and *fine* for finishing.

Result: The new wheel eliminated the need for repeated wheel changes and both Roland Belardnelli, co-owner of Steelcraft, and John Kulpa, chief operator, rate it A-plus for speed and precision, too.

Why not talk to *your* Bay State distributor? Chances are he'll come up with more than one cost-saving idea for your grinding operations.

Better grinding at lower cost—that is his business.

BAY STATE ABRASIVES



Bay State Abrasive Products Co., Westboro, Mass.

In Canada: Bay State Abrasive Products Co., Brantford, Ontario. Branch Offices: Bristol, Conn., Chicago, Cleveland, Detroit, Pittsburgh. Distributors: All principal cities.

Use postpaid card. Circle No. 218

5790 Sizes and types of W&B standard drills cut the need for costly "specials"



NUMBER 555
3-1/2" DIAMETER
26-1/2" O.A. LENGTH

Quality-wise . . . variety-wise, Whitman & Barnes' standard drill line is unequalled in the industry! It provides:

- Specific drill designs for all types of materials and applications.
- A full range of fractional, letter, wire gauge and metric sizes.

W & B's superior in-stock selection of drills frequently enable you to eliminate expensive "specials". You get the advantages of faster service . . . lower costs . . . top-notch performance that is inherent in every W & B tool.



NUMBER 418
.005" DIAMETER
.75" O.A. LENGTH

YOUR W&B DISTRIBUTOR . . . THE BEST SOURCE FOR EVERY DRILL

Your W & B distributor knows the complete line of Whitman & Barnes drills and their best applications. He stocks these standard drills to give you fast service. It will pay you in higher production . . . lower costs to contact him for your every drill need.



LETTER
and PRODUCT
INFORMATION

is available on request.
Drop us a line or contact your W & B distributor
today! No obligation, of course.



W&B HAS SPECIFICALLY DESIGNED DRILLS FOR:

Masonry • Armor Plate • Schotlitz • Brass • Bronze • Cast Iron • Chrome Alloys • Copper • Die Steel • Fibre • Glass • Hard Rubber • Magnesium • Marble • Masonry • Plastic • Sheet Metal • Stone • Stainless Steel • Titanium • Wood • Zinc



WHITMAN & BARNES
"MAKERS OF FINE TOOLS SINCE 1848"
DRILLS AND REAMERS

40045 PLYMOUTH ROAD • PLYMOUTH, MICHIGAN
NEW YORK CHICAGO LOS ANGELES

Performance Plus!

Harig's NEW 6x12 TML SURFACE GRINDER

The new TML by Harig provides extremely fast and accurate grinding, with a new operational ease never before known. 100% more longitudinal travel than before with each rotation of the wheel. You get smooth surfaces in minimum time. Economical—low maintenance.

SPECIFICATIONS

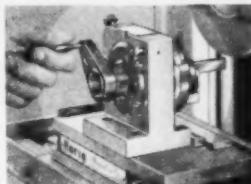
Longitudinal travel.....	12 $\frac{3}{8}$ "
Transverse travel.....	7"
Vertical travel.....	12 $\frac{3}{4}$ "
Working surface of platen.....	6" x 12" $\frac{1}{2}$ " T slot
Grinding wheel.....	7" dia. x $\frac{1}{2}$ " face
Grinds 12 $\frac{3}{4}$ " over platen with 7" wheel	
Standard spindle speed 3000 R.P.M.	
$\frac{1}{2}$ or $\frac{3}{4}$ H.P. motor—Net wt. with motor	
575 lbs.	

Can be used with or without floor stand.



NEW HARIG GRIND-ALL FIXTURE

Fast, accurate perforator grinding attachment — hand crank for easy rotation of index plate, single locking screw for making quick set-ups.



Harig
Manufacturing Corp

5763 W. HOWARD ST. • CHICAGO 31, ILL.
Phone NEwcastle 1-5050

Use postpaid card. Circle No. 220

January, 1958

Now SIMONDS Offers You
a Fine Grained, Silicon Killed

a Fine Grained, Silicon Killed

LOW CARBON Flat Ground Steel

This new line is in ADDITION to



SIMONDS FLAT GROUND DIE STEEL

**High Grade Alloy Tool Steel
(Oil Hardening — Air Hardening)**

Here's a fine-grained, forging quality, silicon-killed steel that opens up the way to important savings on items like jigs, fixtures, patterns, stripper plates, punch pads, die plates, die-blocking shims . . . and parts that don't require heat treatment or in some instances, just case-hardening.

This new line of low-cost, LOW-CARBON Flat Ground Steel rounds out the present Simonds line of Oil Hardening and Air Hardening Die Steel. What's more, it has equally fine finish . . . and is made to the same close tolerances, with excellent welding quality and machineability.

Simonds LOW-CARBON Flat Ground Steel is furnished in a wide range of flats from $\frac{1}{16}$ " to $1\frac{1}{2}$ " thick and $\frac{1}{2}$ " to 16" wide, and in squares from $\frac{3}{8}$ " to $2\frac{1}{2}$ ". All sizes come in standard, ready-to-use 24" lengths, individually packaged. Stock sizes are ready now . . . special sizes on order. Get full details from your Simonds Distributor today.

TYPICAL CHEMICAL ANALYSIS

C. .18 Mn. .50
Si. .20 Phos. & Sul. .04

Heat Treatment By Case Hardening Only

Factory Branches in Boston, Chicago, Shreveport, La., San Francisco and Portland, Oregon
Canadian Factory in Montreal, Que.; Simonds Divisions: Simonds Steel Mill, Lockport, N. Y.
Heller Tool Co., Newcomerstown, Ohio; Simonds Abrasive Co., Phila., Pa., and Arvida, Que., Canada

**For Fast Service
from
Complete Stock**



• 13 •

**SIMONDS
DISTRIBUTOR**

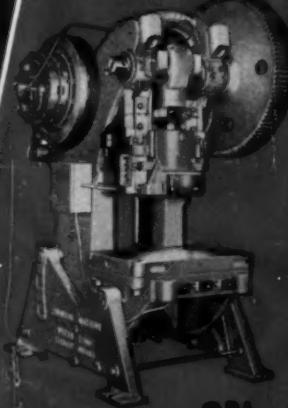
SIMONDS
SAW AND STEEL CO.

FITCHBURG, MASS.

Use postage paid card. Circle No. 331

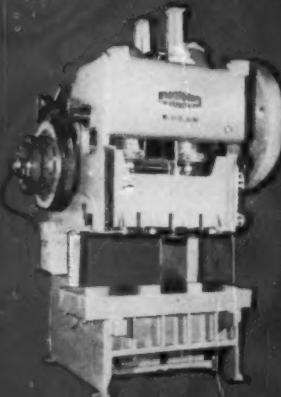
Customers tell us they get
MORE for their money...
that's why they buy these

3 JOHNSON PRESSES

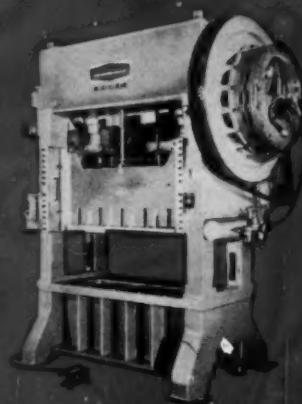


OBI

Models ranging from 10 to 150 tons capacity in regular, special wide or high speed capacities or air clutch.



GAP DOUBLE-CRANK
40-100-125 and 150 ton capacities,
steel fabricated, air clutch, flywheel
or geared models.



STRAIGHT SIDE DOUBLE-CRANK
40-60-80-100-125 and 150 ton capacities
tie rod, steel constructed
air clutch.

Write for Bulletin 1956

Johnson

**MACHINE
and PRESS CORP.**
620 WEST INDIANA AVENUE • ELKHART, INDIANA

Use postpaid card. Circle No. 222

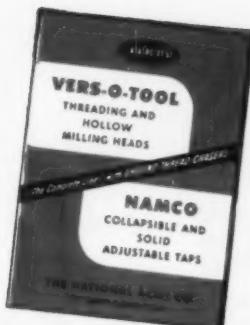
January, 1958

27

Three Namco
VERS-O-TOOLS
on this 1 1/4" RA-6 Acme-Gridley
Bar Automatic
hollow mill the stem and
cut 2 thread diameters
on cast bronze
valve stem

Namco VERS-O-TOOL

lets you use the same head...
with chasers for threading...or with
cutters for hollow milling



Write today for your copy of
48-page Catalog DT-52 or
ask our representative to call.

CIRCULAR CUTTING TOOLS reduce costs on
threading jobs, end forming and turning.

GROUND THREAD CHASERS provide more threads
per grind — and you can regrind to a full
270° of chaser circumference.

BASIC DESIGN SIMPLICITY — fewer moving parts—
insures long, trouble-free performance.

NAMCO CHASER GRINDING SYSTEM permits cutter
settings to be made in the toolroom without
head adjustments — no need for trial
error run after sharpening.

National Acme

THE NATIONAL ACME COMPANY, 177 EAST 131ST STREET, CLEVELAND 8, OHIO
SALES OFFICES: Newark 2, N. J. • Chicago 6, Ill. • Detroit 27, Mich.

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OLIVER TEMPLATE TOOL BIT GRINDER

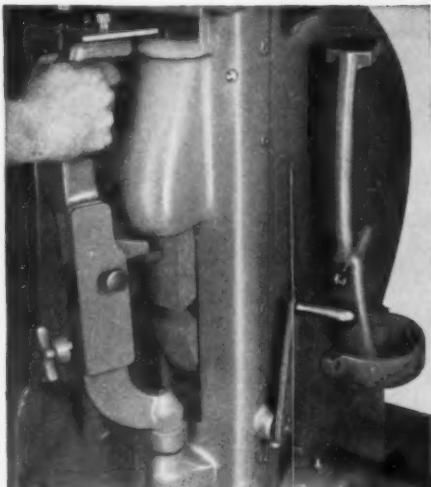
Precision Duplication in **ONE** operation

That's right! The Oliver Template Tool Bit Grinder sharpens single point tungsten carbide, high speed and stellite turning tools . . . duplicating exactly all original flats and radii every time the tool is ground . . . in one simple, efficient grinding operation.

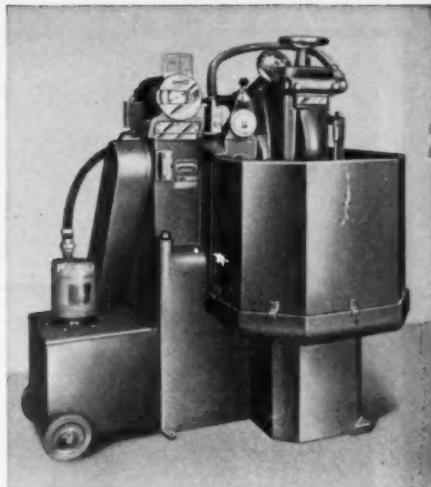
How is it done? Well, as you can see from the drawing above the answer lies in "template control." The template at the top of the specially designed

tool holder is a twice size replica of the tool being ground. The tool, securely held at mid-point in the holder, contacts the wheel and is ground until the template touches the template stop. In this manner, the tool is ground to the exact profile of the template. The entire operation is performed in seconds, easily, accurately on one machine . . . a machine that pays for itself by reducing your tool inventory and eliminating lost production time and tool breakage.

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The Oliver Template Tool Bit Grinder has a 20" wheel that grinds turning tools up to 1½" wide by 1¼" high, from 0° to 20° clearance . . . and to any predetermined contour or angle. The unit is self-contained in that it performs the complete grinding operation as well as template production. All working surfaces are hardened and ground steel and surfaced with tungsten-carbide where necessary to assure long life. A unique feature of the unit is the tool holder which permits an even, easily controlled tool pressure against the wheel. It's an iron frame—supported at its lower end by a ball and socket joint with a template at the upper end giving the operator a 2 to 1 leverage.



Outstanding among the Oliver Tool Bit Grinders' many advantages is ease of operation. Positive "template control" assures duplication of the tool shape in relation to the shank making all tools of a kind exactly alike. A clearance setting gauge determines the correct amount of metal to be removed. A plentiful supply of water, both through the wheel and on the tool, insures against overheating. The Oliver 20" Template Grinder will remove metal . . . both high speed and tungsten-carbide . . . at a speed unmatched by any other single point tool bit grinder currently on the market.

More OLIVER of ADRIAN Tool Grinding Equipment



**ACE TOOL and
CUTTER GRINDER**

Universal—grinds milling cutters, other cutting tools. Especially suited to grinding tungsten carbide.



**DIE MAKING
MACHINE**

Produces dies, gages, cams, templates, stripper plates, etc. at greatly reduced costs. 5 designs in 8 types.



**FACE MILL
GRINDER**

Completely automatic. A machine tool designed for accurate grinding. Wheel dressed with every stroke.



**NO. 510 DRILL
POINTER**

Semi-automatic. For drills $\frac{1}{8}$ " to 3" in diameter. No. 91 bench models available for size $\frac{1}{8}$ " and smaller.



**DRILL POINT
THINNER**

For low cost reclaiming of drills. Corrects off-center and too-thick webs and out-of-index cutting edges.

Just check the coupon for literature on the OLIVER of ADRIAN machine you are interested in. Send it today to . . .

OLIVER of ADRIAN
OLIVER INSTRUMENT COMPANY

1408 E. Maumee St. • Adrian, Michigan

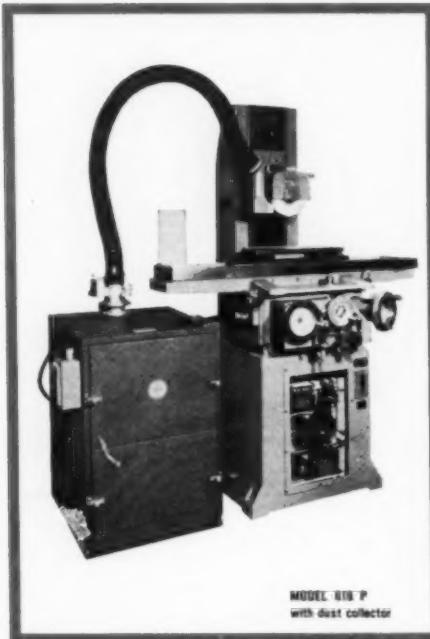
- Drill Pointer
- Face Mill Grinder
- "Ace" Universal Tool and Cutter Grinder
- Literature only
- Die Making Machine
- Drill Point Thinner
- Template Tool Bit Grinder
- Quotation requested

NAME _____

COMPANY _____

STREET _____

CITY _____ ZONE _____ STATE _____



MODEL 618 P
with dust collector



REID-O-MATIC 824 . . .
Fully automatic

**Industry's
number one
choice . . . for
toolroom and
production economy!**



*Manufacturers of precision
surface grinders for
production and toolroom needs*

The vast number of REID *precision* surface grinders, in all kinds of industry, is the best proof of their outstanding quality.

In the 618 class these different models are available; a 618 P with power operated table and cross feed — a 618 PT with power table and hand operated cross feed — and a completely manual grinder, the 618 H. Automatic lubrication and a Cross Slide Lock are included on REID grinders as standard equipment.

The REID-O-MATIC is a fully automatic, all electric, surface grinder with a capacity 8" wide, 24" long and 21" from the table to the center of the spindle.

For your production and toolroom grinding, REID surface grinders offer the maximum in convenience, quality and economy.

Accessories can be furnished for wet grinding, cool grinding, dust collecting and other needs.

Complete specifications will be sent on request.

REID PRECISION SURFACE GRINDERS

REID BROTHERS COMPANY, INC. / 133A ELLIOTT ST. / BEVERLY, MASSACHUSETTS

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ANOTHER CUSHMAN CHUCK AT WORK!

Hold it, right and machine it faster—with...
CUSHMAN manually operated chucks,
air operated chucks and cylinders,
power wrench chucks and power wrenches,
pinch jaw chucks—hand and automatically operated,
boring mill and face plate jaws.

CUSHMAN CHUCKS.
a product of American quality,
labor and materials.

Sold through
your industrial
distributor.

THE CUSHMAN CHUCK COMPANY

Hartford 2, Conn.



6552



Bearings, Inc. service...this catalogue ...these plant men add up to big savings in bearing purchases!

Our Bearing Engineer was given permission by his customer to survey and compile a list of all equipment in their new plant. The proper bearings for each piece of this equipment were then catalogued. Shown above is the plant engineer, plant superintendent, and our sales engineer going over the results of his work. This catalogue shows application data on all machinery in the plant and lists the total number of bearings in the plant by size and bearing manufacturers numbers.

It's now the "Bible" of the plant for bearing purchases and savings, since its completion, have been impressive!

Maintenance men now know the exact replacement bearing to requisition from stock. All bearings are correctly identified and are now ordered with the proper bearing numbers. Stocking several identical bearings for different machinery applications is eliminated.

We can perform this and many other services for you... For if it's a bearing problem, a call to our nearest branch will get you the answer!

Providing bearing service

in the North

and

in the South

BEARINGS, INC.

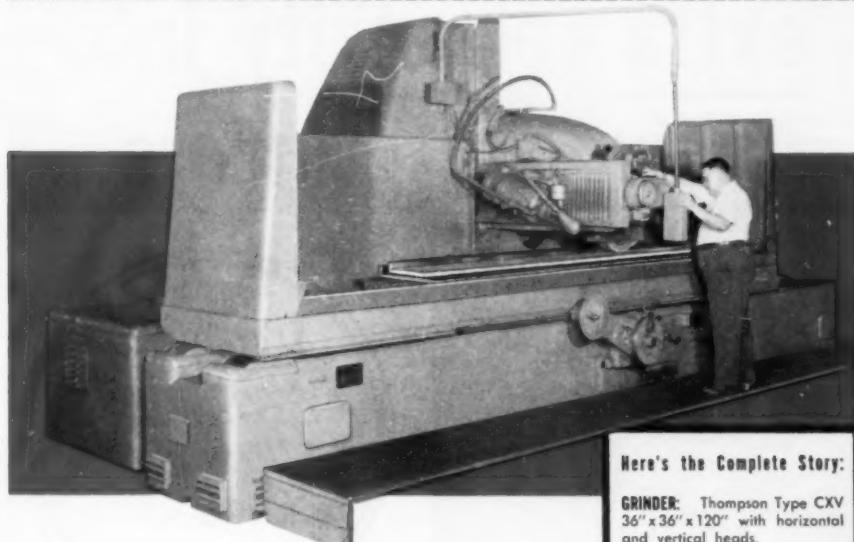
OHIO: Akron • Canton • Cincinnati • Cleveland • Columbus • Dayton • Elyria • Hamilton • Lima • Lockland • Mansfield • Toledo • Youngstown • Zanesville
INDIANA: Ft. Wayne • Indianapolis • Munici • Terre Haute • **PENNSYLVANIA:** Erie • Johnstown • Philadelphia • Pittsburgh • York
WEST VIRGINIA: Charleston • Huntington • Parkersburg • Wheeling • **NEW JERSEY:** Camden
NEW YORK: Buffalo • Binghamton Corp. • **MARYLAND:** Baltimore • **DELAWARE:** Wilmington

DIXIE BEARINGS, INC.

FLORIDA: Jacksonville • **GEORGIA:** Atlanta • **KENTUCKY:** Louisville • **LOUISIANA:** Baton Rouge • New Orleans
N. CAROLINA: Charlotte • Greensboro • **S. CAROLINA:** Greenville • **TENNESSES:** Chattanooga • Kingsport • Knoxville • Nashville

**When large parts must be ground
to total tolerances of .0005" or less**

**THOMPSON GRINDERS WITH THE NEW
HYDRA-COOL HYDRAULIC SYSTEM SOLVE THE PROBLEM!**



Machine ways up to 118" for The Michigan Tool Company's Roto-Flo Spline Rollers must be ground to .0005" total tolerance. Heat distortion, caused by hydraulic heat, became a critical problem in achieving this tolerance.

During the three months of operation since the installation of Thompson's new Hydra-Cool Hydraulic System*, these long ways are being ground to consistent .0003"- .0004" total tolerances. Heat distortion is eliminated. Scrap loss is reduced to zero. Grinding time is greatly reduced.

THOMPSON GRINDERS WITH THE NEW HYDRA-COOL HYDRAULIC SYSTEM MAY BE THE ECONOMICAL SOLUTION TO YOUR GRINDING PROBLEM. WRITE TODAY FOR FULL PARTICULARS.

Hydra-Cool also offers you these exclusive advantages:

- Heat damage to hydraulic seals, valves, controls and pump is eliminated.
- Break down of additive-type hydraulic oils is prevented—sludge will not form in the Hydra-Cool System.
- Lengthy warm-up periods are eliminated.
- Power costs are greatly reduced.

Hydra-Cool is standard on all Thompson surface grinders 40 inches and up in work length AT NO EXTRA COST.

THE THOMPSON GRINDER CO., Springfield, Ohio, U. S. A.

*Pat. Applied For

"Keep THOMPSON in mind for that daily grind"

Use postpaid card. Circle No. 227

January, 1958

Here's the Complete Story:

GRINDER: Thompson Type CXV 36" x 36" x 120" with horizontal and vertical heads.

PART: 118" way for Michigan Tool Co. Roto-Flo Spline Roller.

RATE OF TABLE TRAVEL: 100 ft./Min.

MATERIAL REMOVED: .065".

METAL: Flame hardened Ductile Iron.

WHEEL: 20x4x12 H Grade.

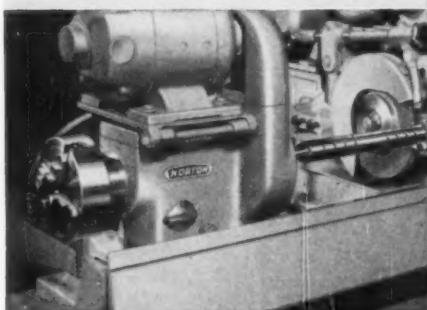
SCRAP LOSS: None.

GRINDING TIME: 3-4 hrs.

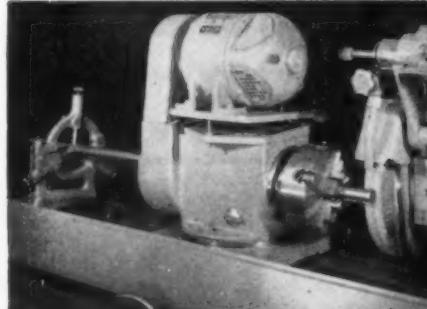


Norton builds extra versatility into universal grinders...

JOB-SPEEDING FEATURES

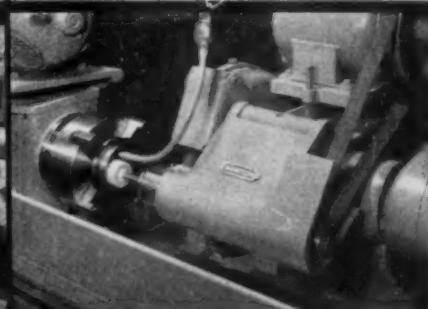


Chucks may be left mounted on one end of the headstock.

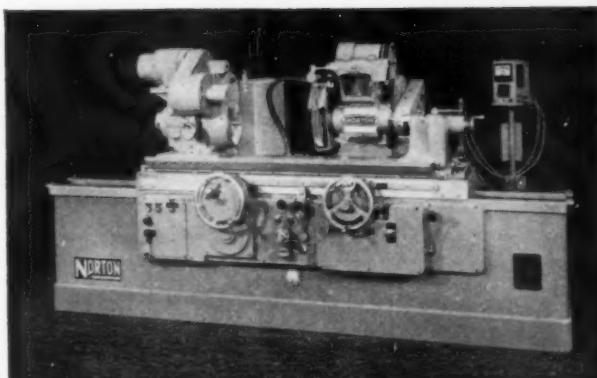


Hollow headstock spindle increases capacity for grinding long bars.

*to put
extra dollars
in your
pocket*



Hinged-bracket type internal grinding spindle greatly speeds setups.



Norton 14" Type U-4 universal grinder. Norton also builds universal grinders in 12" and 10" sizes. SWIVALIGN* Dual Electric Indicator, at right of picture, measures swivel table adjustment and is optional on all.

Norton universal grinders are rated as practically "complete grinding departments." These popular machines handle many different types of grinding — external, internal, face, taper and angular wheelside — they are built with many famous job-speeding, cost-cutting features. For example:

Extremely rapid chucking . . . quick change-over to live or dead spindle operation . . . easy work speed changes . . . independent wheel settings that do difficult jobs fast . . . extra capacities on wheel head and headstock . . . precise swivel table alignment with SWIVALIGN Dual Electric Indicator, an optional

extra to eliminate cut-and-try.

Norton universal grinders are made in exactly the size you need — 10", 12", 14" and 18" swing capacities and in lengths from 20" to 72" between centers — to bring you many time-and-money-saving "Touch of Gold" advantages. For complete facts on these high-efficiency machines see your Norton representative or write us direct. And remember: only Norton offers you such long experience in both grinding machines and grinding wheels to help you produce more at lower cost. NORTON COMPANY, Machine Division, Worcester 6, Mass.

*Trade-Mark Reg. U. S. Pat. Off. and Foreign Countries

To Economize, Modernize with NEW

NORTON

GRINDERS and LAPPERS

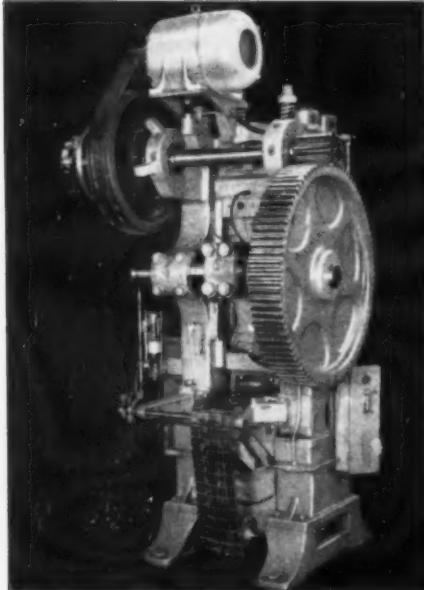
District Offices: Worcester • Hartford •

In Canada: J. H. Ryder Machinery Co., Ltd., Toronto 5

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NORTON PRODUCTS: Abrasives • Grinding Wheels • Grinding Machines • Refractories
BEHR-MANNING PRODUCTS: Coated Abrasives Sharpening Stones • Behr-cat Tapes

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FERRACUTE

E-401 Embossing Press
eliminates expensive
milling operations
for automotive
manufacturer

Ferracute Embossing Press E-401, 400 ton model

Produces rocker arms for intake and exhaust valves two at a time—30 strokes per minute—total production 3,600 pieces per hour. Ferracute top toggle, tie-rod construction Embossing Presses are available in a complete range of sizes from 150-ton to 1,500-ton. Ruggedly constructed and extremely powerful, these presses may often be used to move the metal cold and thus replace costly milling operations.

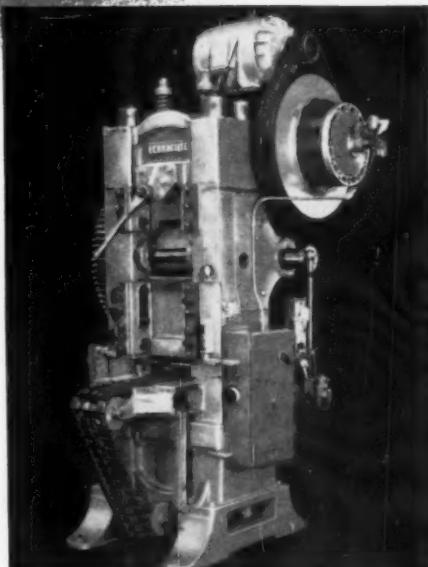
Our engineers will be glad to survey your production with an eye to similar economies. Write for complete information.

FERRACUTE MACHINE CO.

SINCE 1863 MANUFACTURERS OF

Power Presses, Press Brakes,
and Special Machinery

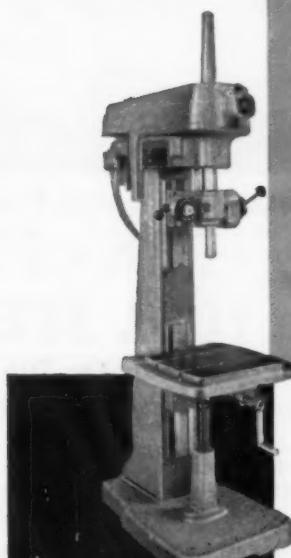
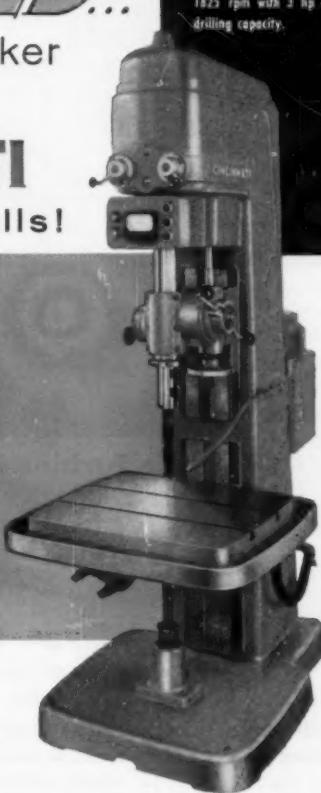
BRIDGETON, NEW JERSEY, U.S.A.



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Here is
INFISPEED...
 a new profit maker
 built into
CINCINNATI
 Sliding Head Drills!

***HEAVY DUTY** Models in 21" and
 25" sizes; floor type; box column in
 single and multiple spindle, round
 column in single spindle only. 60 to
 1825 rpm with 3 hp motor, 1½"
 drilling capacity.



MEDIUM DUTY Models in 16" and
 24" sizes, bench and floor types,
 single and multiple spindle, 450 to
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 drilling capacity.

New INFISPEED gives you the exact speed you need for each drilling job; infinitely variable spindle speeds within the speed range. Fast operating too! Speed change control is right on the front of the machine, with all other controls. Adjacent tachometer shows exact rpm's.

Cincinnati INFISPEED Sliding Head Drills are built in four sizes, with all of the well-known Cincinnati profit-making features included, of course. Ask your CL&T dealer for details, or write us direct.



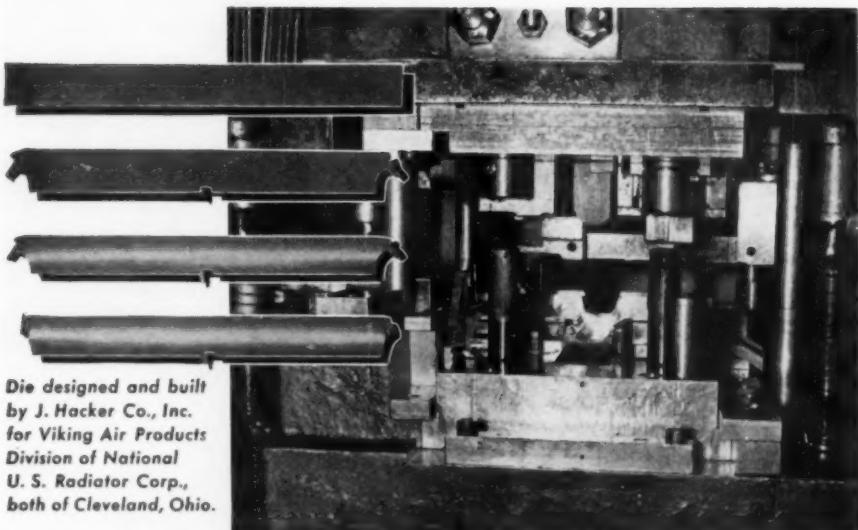
Improved Machining Through Research
CINCINNATI LATHE AND TOOL CO.

3207 Disney Street • Cincinnati 9, Ohio
 "Troy-Top" Lathes / "Cincinnati" Drilling Machines / "Spirapoint" Drill Sharpeners

Use postpaid card. Circle No. 230

January, 1958

37



Die designed and built
by J. Hacker Co., Inc.
for Viking Air Products
Division of National
U. S. Radiator Corp.,
both of Cleveland, Ohio.

Over 8,000,000 Air Turbine Blades... Still Going Strong!



PRK • 33 TOOL STEEL

4 Stage, Automatic Transfer Die

This is an exceptional example of the fatigue life, resistance to wear and ability to hold an edge, all in one die.

No die sections have been replaced—proof of fatigue life. Accuracy still maintained—proof of wear resistance. Average of 609,000 pieces produced between sharpenings—proof of ability to hold an edge.

Complete Line of highest grade Tool Steels, including PRK-33, DARWIN No. 1, NEOR, MINEOR, OHT, "MT6" and various grades of Hot Work Specialty Steels. Furnished in Bar Stock, forgings, and Sand Castings, Drill Rod, Flat Ground Stock and Tool Bits.

Bulletin on Request.

- This is just one demonstration of PRK's superiority.
- Ask for a Darwin and Milner engineer to show you how this outstanding material can be used to solve your tool steel problems.

DARWIN & MILNER Inc.

highest grade tool steels

**2345 ST. CLAIR AVENUE ★ CLEVELAND 14, OHIO
★ 900 MICHIGAN AVENUE ★ COLUMBUS, OHIO ★**

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MACHINE and TOOL BLUE BOOK

look
your
problem
in the
eye

No need to scratch around for a solution to your grinding wheel problems. Switch to CINCINNATI (PD) WHEELS. For now CINCINNATI GRINDING WHEELS offer POSITIVE DUPLICATION — a remarkable achievement in precision manufacturing and quality control that can save you money . . . and increase your production.

And there's no reason to howl when it comes time to duplicate the original wheel when you reorder, for CINCINNATI (PD) WHEELS assure you of POSITIVE DUPLICATION of the original wheel every time you reorder. "On Grade" with a CINCINNATI (PD) WHEEL means all future (PD) wheels will perform and grind exactly alike.

Yet, CINCINNATI (PD) WHEELS will cost you no more than ordinary wheels.

So, today, see your CINCINNATI Grinding WHEELS Distributor. He'll be glad to explain how (PD) WHEELS will save you money and



increase production. Or contact us direct and we'll send one of our representatives — specialists who know grinding and grinding machines as well as grinding wheels. Write, wire, or telephone Sales Manager, Cincinnati Milling Products Division, Cincinnati 9, Ohio.

Remember — only CINCINNATI GRINDING WHEELS give you



POSITIVE DUPLICATION

CINCINNATI
Grinding Wheels

A PRODUCTION-PROVED PRODUCT OF THE CINCINNATI MILLING MACHINE CO.

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January, 1958

39

**new clean-sweep styling and modern power
features open the way to new production peaks**



totally enclosed

inboard drive

wrap-around crown

power clutch

power brake

power treadle

power

**ALL
NEW**

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30 AND 50 TON * PRESS BRAKES

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The **RIGHT** rivet, plus the **RIGHT** riveting machine will
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The correct combination of rivet and machine requires expert knowledge available to you through Chicago Rivet engineers.

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multiple automatic rivet setters.



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MACHINE and TOOL BLUE BOOK

SHELDON

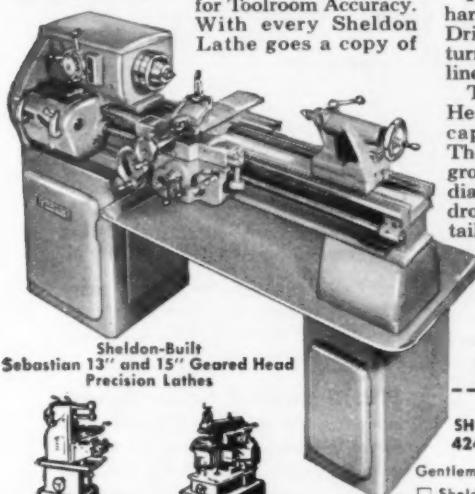
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for the size Lathes You Need Most

Sheldon lathes are built in the sizes you need most, for toolroom and production jobs. They are available with swings of 10", 11" and 13" . . . in varying bed lengths with 18" to 48" center distances . . . and . . . in your choice of pedestal, cabinet or bench mountings.

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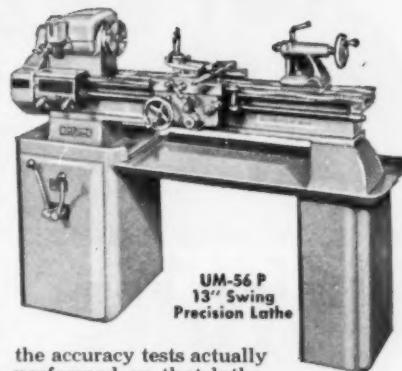
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Builders of Sheldon Lathes, Milling Machines, Shapers and Sebastian Lathes.

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January, 1958



**UM-56 P
13" Swing
Precision Lathe**

the accuracy tests actually performed on that lathe.
(19 checks).

Important optional features include: hardened bed ways, L00 Long Taper Key Drive spindles, 4" D1 Camlock spindles, bed turrets, taper attachments and a complete line of toolroom and production accessories.

The new Sheldon-built Sebastian Geared Head Lathes have greatly increased work capacity and many advanced features. These include a wide, heavy, hardened and ground bed . . . easy shifting spindle speed dial . . . 60-pitch gear box . . . independent drop lever apron clutches . . . cam-action tailstock clamp . . . and, automatic lubrication in the headstock and apron with "1-shot" lubrication of carriage.

Send in coupon or write for catalogs and names of nearest Sheldon and Sebastian Distributors where you can see these new lathes in operation.

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- Sebastian 13" and 15" Geared Head Lathes
- Horizontal Milling Machine Name of Local Dealer
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Company Name

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Hold mill-like tolerances

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DAY IN,
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**MODEL M-100 Chop-Stroke
Cut-Off Machine gives fast,
accurate, fully automatic cutting**

Cuts any stock . . . in a wide range of shapes, lengths and diameters . . . any material, from aluminum to hardened tool steel. The M-100 will cut it swiftly, cleanly, accurately. Set-ups or resets are easily made. The M-100 cuts at a rate of 2 to 4 seconds per sq. in. cross sectional area . . . up to 5 times faster than comparable power cutting. Exclusive Stone geared-in-head motor delivers maximum power to the cutting edge. Greater speed of cutting produces no change of characteristics nor hardening of material cut.

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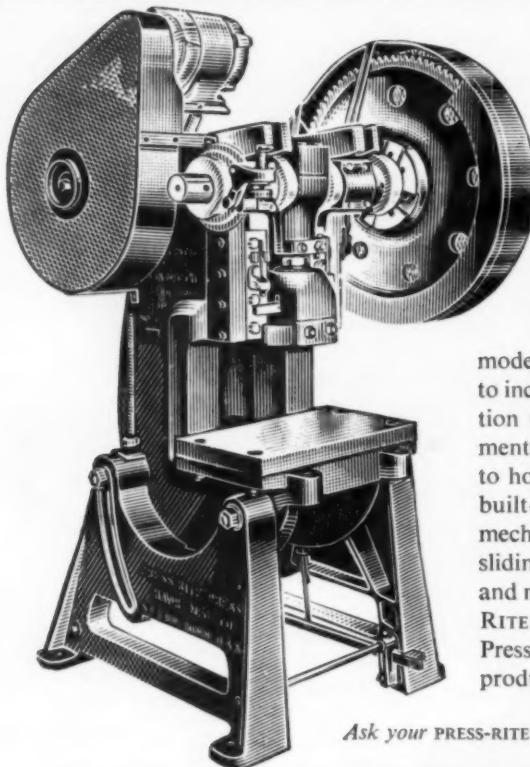
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45



PRESS-RITE O. B. I. POWER PRESSES

2 TON
TO
85 TON



No. 3½—37 Ton Back-gearred Press illustrated includes PRESS-RITE features that increase production and die life, cut maintenance costs.

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They help protect his profits

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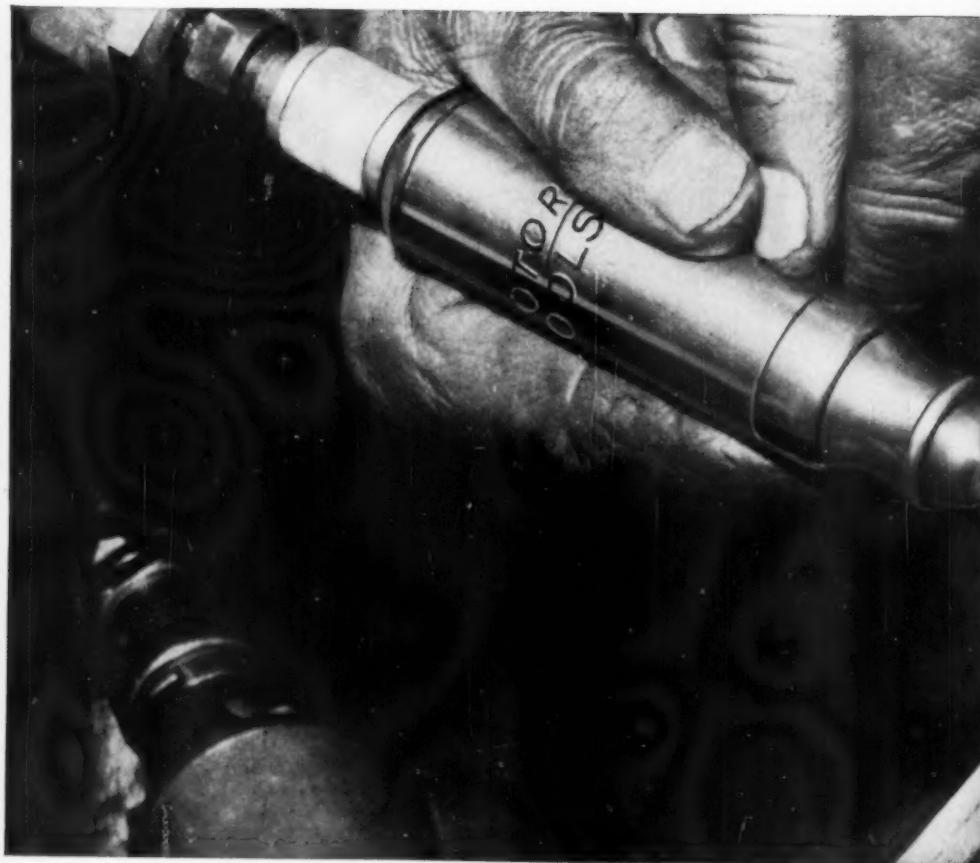
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January, 1958



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**WITH ROTOR'S
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BLADED TYPE TOOL**

JOB: Die grinding. Formerly used
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RESULTS: Pl. 1

bulky turbine type air grinders.
Singer.



RESULTS: Bladed type motor of Rotor D-03 cut job time 20% because of its ability to deliver higher speed under load. Tool paid for itself in 8 weeks. Also, tool is lighter, more compact . . . easier to handle, more versatile. Full details in Bulletin 42A.

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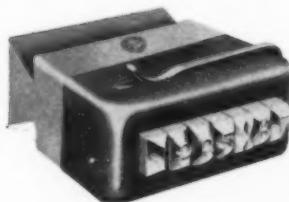
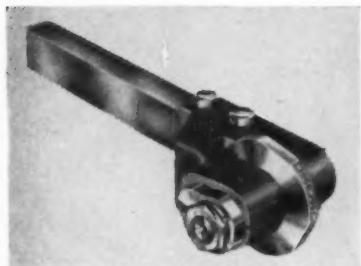


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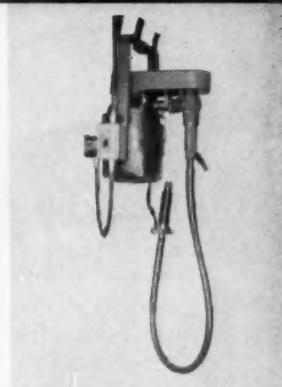
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FLEXIBLE SHAFT MACHINES



faster

Haskins machines will speed production on a big variety of metal-working jobs with their continuous speed and unerring performance. And there's no need to worry about changing tools—it takes just seconds to switch to any one of the numerous metal-working attachments in the Haskins line. *Use Haskins equipment and eliminate interruptions.*

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January, 1958



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HEAVY DUTY
"SPIRO"
DRILL CHUCK

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Perfectly balanced Spiro chucks meet the most exacting performance demands—they are completely tested after assembly.

Long-life—designed for heavy duty use, Spiro chucks are made of quality steel that is hardened and precision ground to assure uniform results.

Quick hand tightening and release—no key is required—bearings provide inherently easy hand tightening and release.

Non-slip grip—Spiro chucks have tremendous gripping power that automatically tightens as load increases—drills will not slip.

Spiro saves time—when frequent tool changes are required, quick hand tightening and release greatly reduce down-time.

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RT-1404-7

BARNES U.S.A.

ONE-PIECE
CONSTRUCTION

HIGH-SPEED
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Every Barnes Rocket Blade is *shatter-proof* and *scoreproof* for maximum cutting performance and long life.

Barnes exclusive "Gradient Hardness" is the reason. Blade hardness is graduated from tough, hard teeth for best cutting ability to a strong, semi-hard back for flexibility and resistance to scoring.

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Barnes Rocket Blades require only low cost, water soluble coolants—yet *do not score*. Scoring wastes power and shortens blade life. Special oil coolants retard scoring but add cost and create safety hazards.

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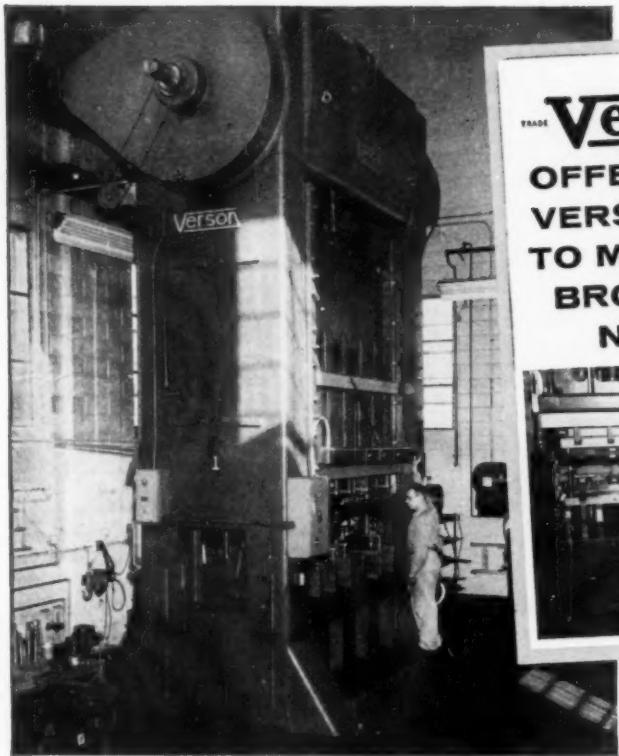
He has a complete stock of Rocket blades for all your power or hand hack saw requirements!



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VERSATILITY
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Die tryout for a tool and die shop is probably one of the severest tests of the versatility of a press. At Westlof Tool & Die Co., Detroit, Michigan, a 300 ton Verson double crank, straight side press is used for this purpose.

The press itself incorporates several features which are examples of the versatility Verson engineering can provide: The ram is equipped with three triple bank cushions adjustable right or left to 7" centers.

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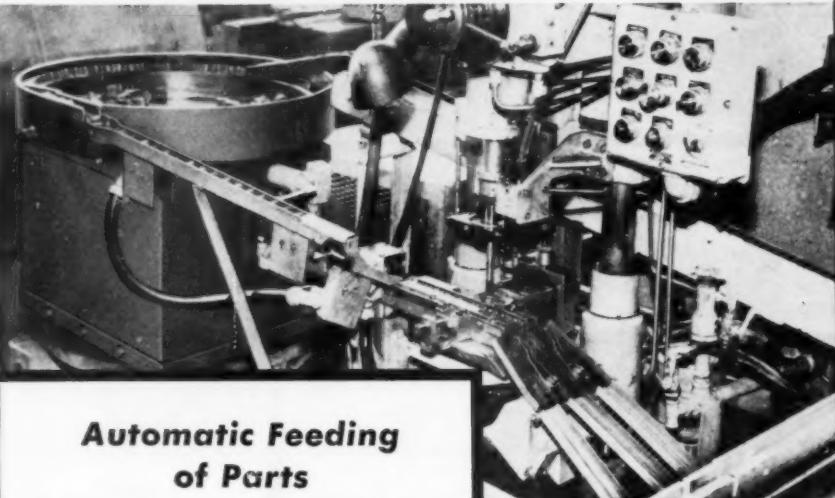
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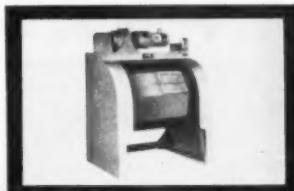


MECHANICAL SEPARATOR ▶

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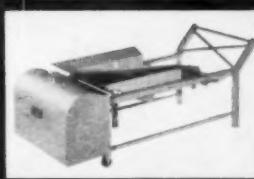
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5 sizes—Working barrel capacities from 1 to 11.7 cu. ft.
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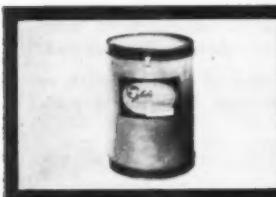
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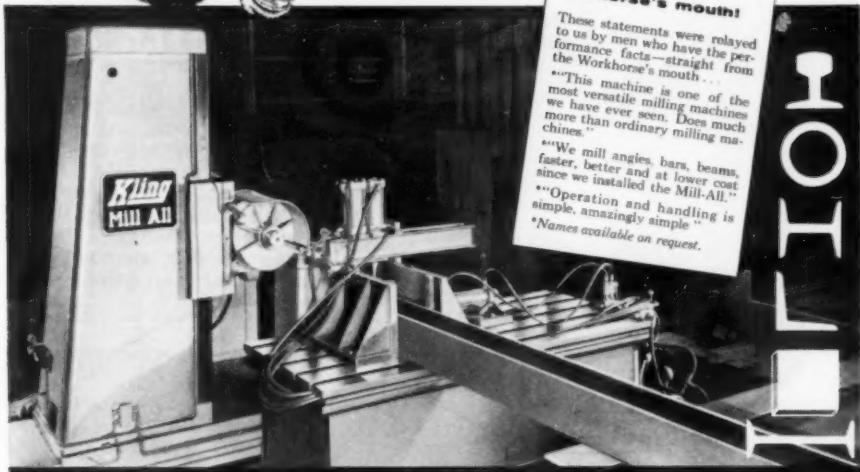
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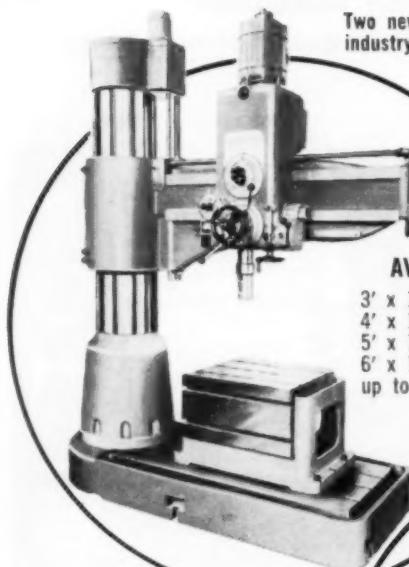
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300 MM

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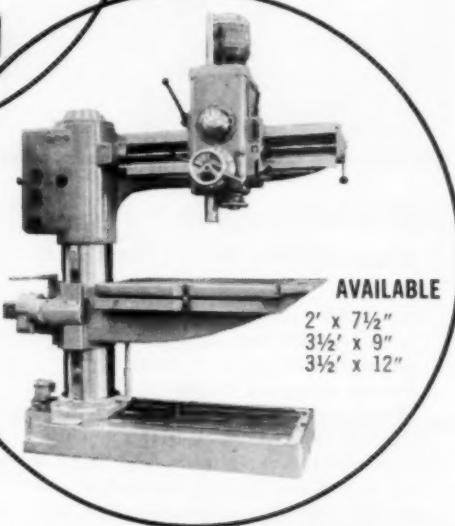


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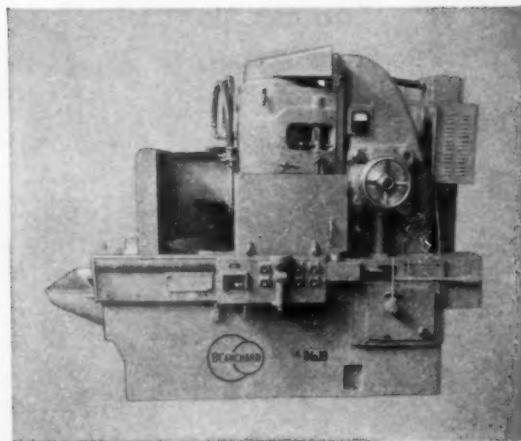
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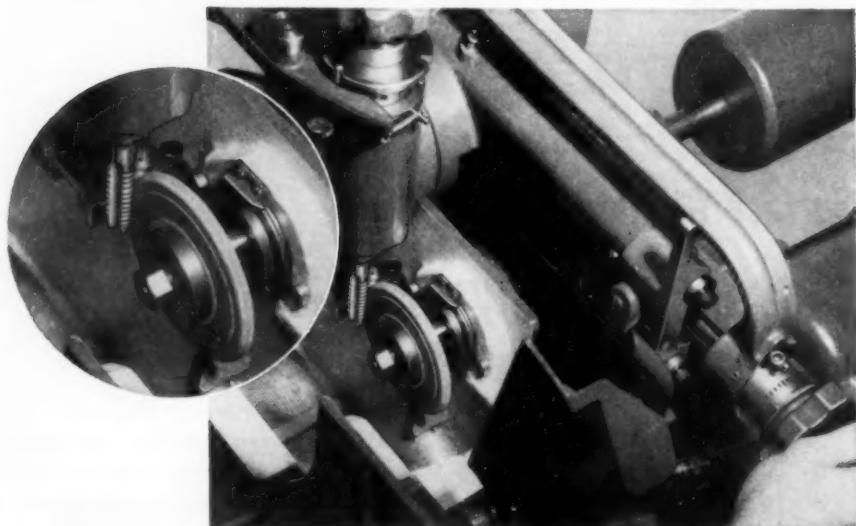
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NOW — You can control rake or hook angle and insure accurate indexing of cutting edges* of taps with the BLAKE FLUTE GRINDER.

*Just as necessary on taps as on milling cutters.



Keep it sharp — Make 1 tap do the work of 6 with The Blake Flute Grinder.

This accuracy will result in uniformity of hole, much longer life for your taps and a surprising savings in tap costs.



Write for bulletins on BLAKE Tap Sharpening Machines

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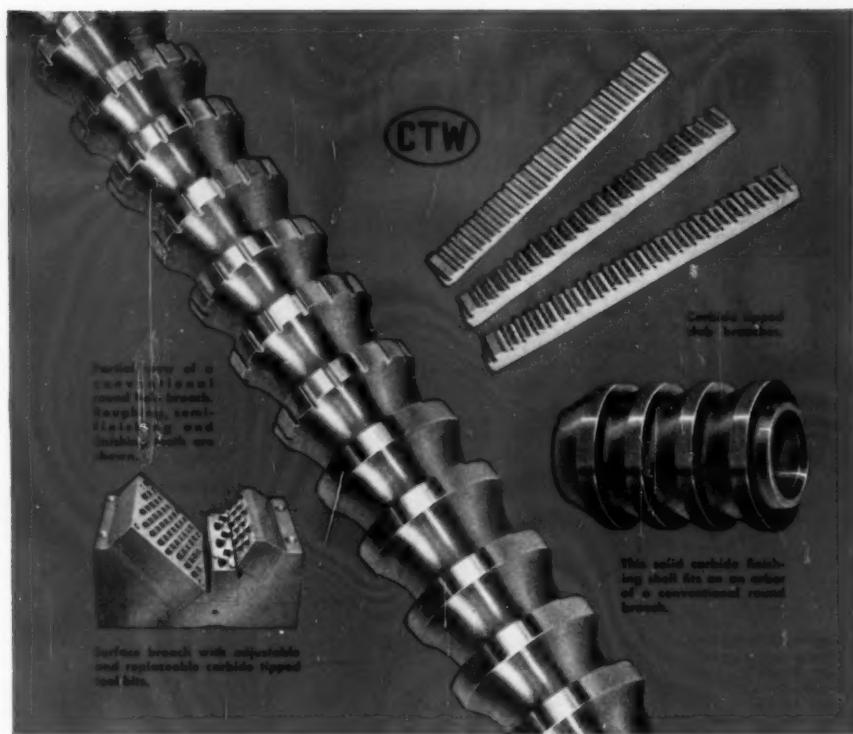
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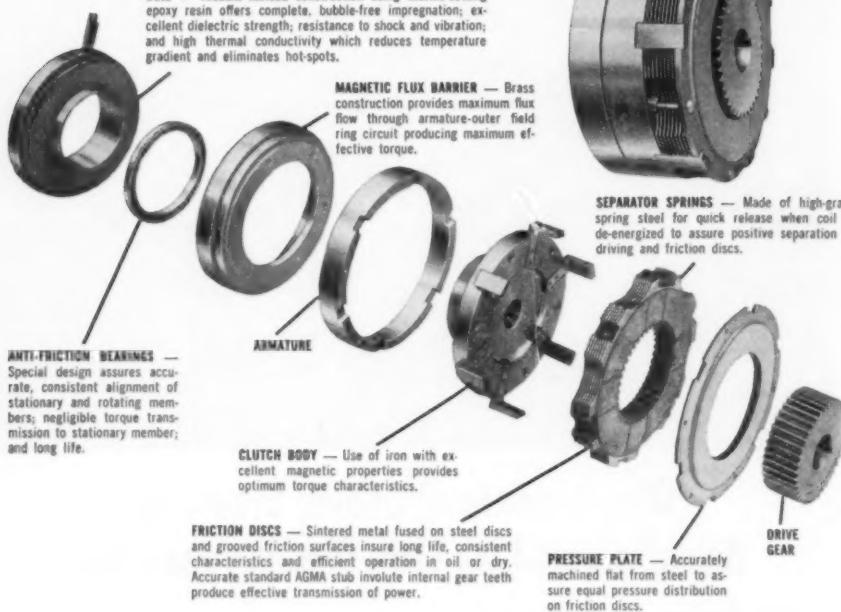
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FAWICK MAGNETIC— CLUTCHES & BRAKES

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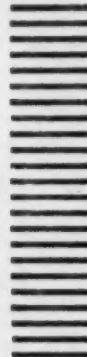
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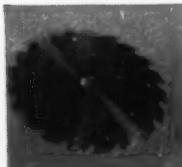
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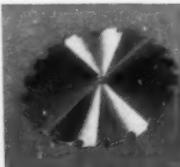
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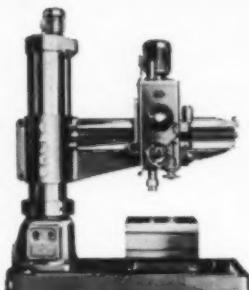
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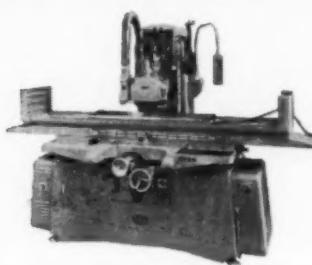
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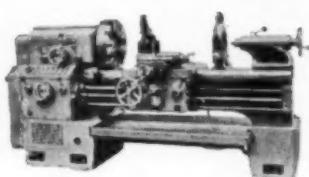
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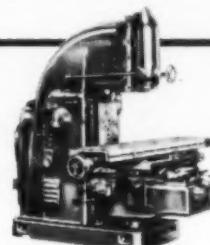
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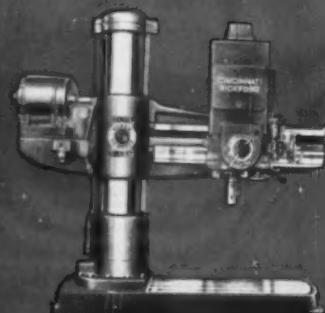
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- Exclusive HERRINGBONE drive—the only radial built with this advanced feature.
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- It spins up to 2000 rpm, 10 feeds including 8 pound tap loads.



CINCINNATI BICKFORD

Super Service Radials

MODERN DESIGN and latest engineering developments built in the ALL-NEW Super Service Radial drilling machines give you *higher production . . . faster, safer operation . . . and greater machining accuracy.* Here are a few of the reasons why:

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A positive safety device is provided in the head traverse mechanism to guard against damage should the head strike the workpiece or other objects during traverse. This safety functions at any point of head travel on arm. Head-moving HAND-WHEEL DOES NOT REVOLVE when head is being traversed by power.

A pre-loaded, four-bearing, chrome nickel spindle and chromium plated sleeve . . . supported in a honed head bore over 17" long . . . assure maximum spindle rigidity, regardless of position.

The ALL-NEW Super Service Radials are available with 13", 15", 17" and 19" dia. columns, and 4, 5, 6, 7 and 8-ft. arms. For complete specifications on these powerful radial drilling machines, see your nearest Cincinnati Bickford sales representative.



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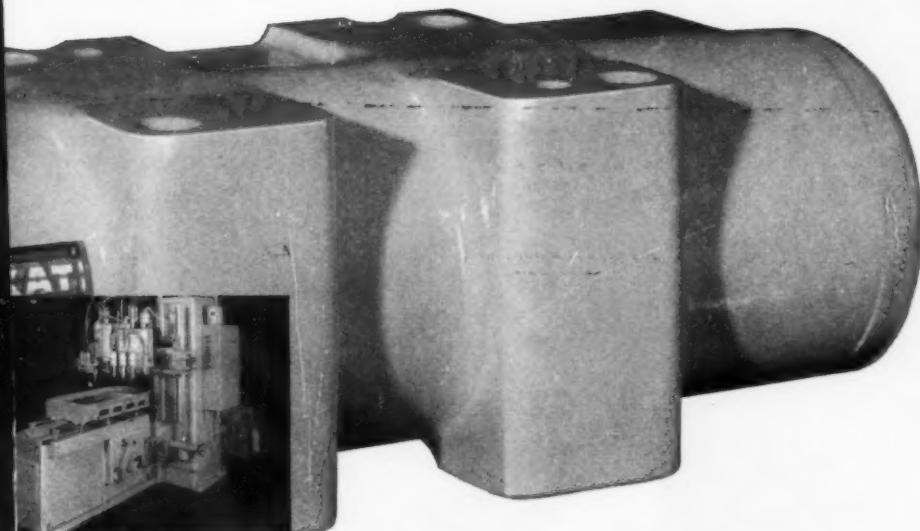
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**KOPY-KAT
DUPLICATION**

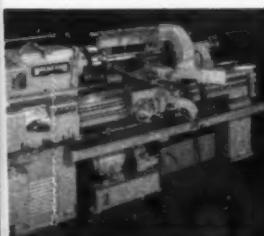
**is versatile,
highly sensitive,
extremely accurate!**



Hydraulic Openside Shaper



Hydraulic Openside Planer



Rockford Tracer Lathe

The versatility of the Kopy-Kat Duplicator is continually solving duplicating problems in many production machining shops. Its amazing sensitivity, power and precision, coupled with the efficiency of Hydraulic Shapers, Planers, Slotters, Shaper-Planers . . . and Lathes, saves many hours in set-up and production time.

Kopy-Kat Duplication is direct hydraulic transfer with no intermediate motions, completely automatic, and as a result chances for error or irregularities in the final work are greatly reduced.

The Kopy-Kat Duplicator is specifically engineered for application on Hydraulic Shapers, Planers, and Slotters, and it becomes an integral operating part of any machine on which it is installed. Form tolerances are precisely held through the sensitivity of the Kopy-Kat selector valve.

When you are considering form machining, be sure to check all of these advantages on a Kopy-Kat equipped machine.



get the facts...

completely described in this new Bulletin 1300. Request on your letterhead will bring you a reply promptly.

A new motion picture film "The Rockford Kopy-Kat" is also available through your local distributor.



ROCKFORD MACHINE TOOL CO.
2500 KISHWAUKEE STREET • ROCKFORD, ILLINOIS

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January, 1958



*Illustrated is a Lucas
Horizontal Boring Machine
equipped with a Gusher Coolant
Pump tank unit.*

with Ruthman **GUSHER** Coolant Pumps

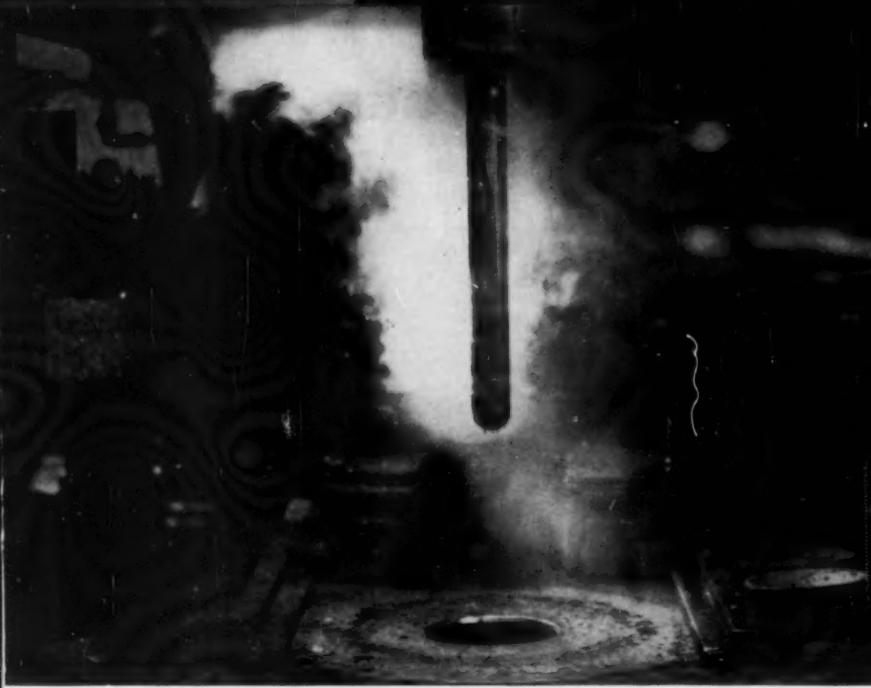
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THE **Ruthman**  **MACHINERY CO.**

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MACHINE and TOOL BLUE BOOK



Tough 2½" diameter mandrel at Rc 44 on 1150 ton brass extrusion press. Scovill Manufacturing Co.

Mandrel of HALCOMB 218 retains toughness and hardness at hot work temperatures...

This mandrel is made of Halcomb 218—a tough, air-hardening hot work steel. Halcomb 218 is suitable for tools like this which require a higher degree of toughness at moderately elevated temperatures than is obtainable with the tungsten types of hot work steels. And Halcomb 218 retains both its hardness and strength at these temperatures.

For example, at a hardness of Rc 44, Halcomb 218's Charpy Impact Strength is 33 ft-lbs at 500°F. And it will retain this hardness after 1 hour, after 10 hours and even after 100 hours at temperatures up to 900°F.

Properties like these cut tooling costs. The mandrel shown above is good for 1200 pushes, for example, and even then all it needs, usually, is repolishing before being used again.

Halcomb 218 is particularly useful for all hot work operations on which drastic coolants are used. It even resists breaking very successfully when water cooled in operation. If these sound like advantages you can use, call your local Crucible representative for more complete data. *Crucible Steel Company of America, The Oliver Building, Mellon Square, Pittsburgh 22, Pa.*

CRUCIBLE

first name in special purpose steels

Crucible Steel Company of America

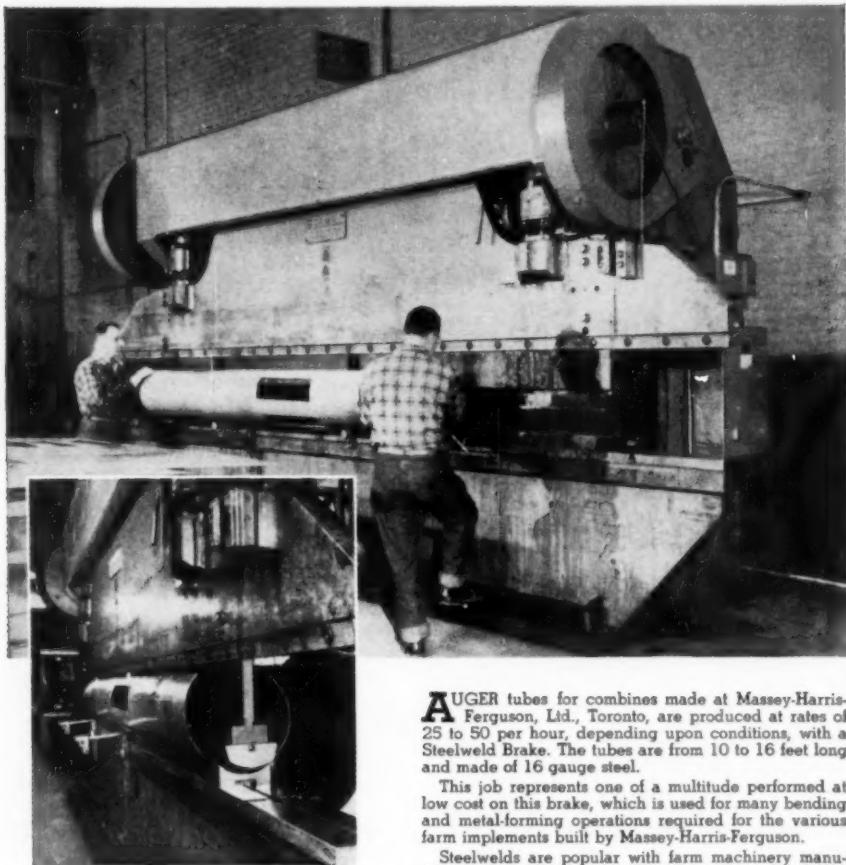
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COMBINE AUGER TUBES

25 to 50 Made Per Hour at
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Steelweld Brake in service since 1950.
Bed and ram are 18'-0" long including
2'-0" extensions at both ends. Bending
capacity rated at 12" x 3 $\frac{1}{2}$ ".



Flat metal is quickly formed into a cylinder by a series of pressure contacts with this die arrangement.

STEELWELD PRESS BRAKES

AUGER tubes for combines made at Massey-Harris-Ferguson, Ltd., Toronto, are produced at rates of 25 to 50 per hour, depending upon conditions, with a Steelweld Brake. The tubes are from 10 to 16 feet long and made of 16 gauge steel.

This job represents one of a multitude performed at low cost on this brake, which is used for many bending and metal-forming operations required for the various farm implements built by Massey-Harris-Ferguson.

Steelwelds are popular with farm machinery manufacturers and have been serving many for years. They perform accurately, keep going continuously on long production runs without need of frequent adjustments, tinkering and maintenance. They are easy and safe to operate. Dies are quickly changed.

Because Steelweld Brakes are heavily built machines loaded with features that will help you; it will be to your interest to give them serious consideration when additional brakes are needed.

Write for free copy of Catalog No. 2010
Gives construction and engineering details

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MACHINE and TOOL BLUE BOOK

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U. S. Steel Supply's

ANY STEEL
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ANY TIME
SERVICE

means to
Dray Manufacturing Co.

"Dependable Service from U. S. Steel Supply has
INCREASED PRODUCTION

50% "

says
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President,
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Company, Inc.

- By using U. S. Steel Supply's ANY STEEL, ANYWHERE, ANY TIME SERVICE, Mr. Dray eliminated a voluminous inventory. "We previously carried a \$60,000 stock of cold-rolled steel sheets," he says. "Today, we have less than \$16,000 worth on hand, because we have our steel delivered, if necessary, on a day-to-day basis from U. S. Steel Supply. The increase in available working capital, which had been tied-up in inventory, permitted us to buy additional production equipment.

"Secondly," says Mr. Dray, "our reduced inventory also made an extra 10,000 square feet of space available for increased production facilities and machinery." Steel buyers, like James H. Dray, have found that by using ANY STEEL, ANYWHERE, ANY TIME SERVICE it is actually *less expensive* to buy from U. S. Steel Supply.



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SPEEDS BENDING ODD SHAPED PARTS

...TUBING, PIPE, EXTRUSIONS, ETC.

Pines Model 1400 with extended base, handles 10 ft. lengths of tubing over mandrel. Standard machine takes 4 x 8 ft. floor space.

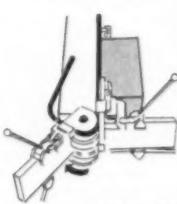
PINES 2-IN-1 Bender

ADVANTAGES OF PIVOTING HEAD



PROBLEM

Counter-clockwise rotation results in work piece striking machine base.



SOLUTION

Changed to clockwise operation, machine makes 120° bend without interference.

New Model 1400 Handles Both Clockwise and Counter-Clockwise Operations . . .

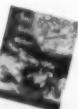
For experimental, small lot, and production work, Pines Model 1400 Bender offers outstanding advantages. Designed with double tool-holder ways and a pivoting head assembly, you can handle multiple planes and odd shapes fast and efficiently. Change-overs from clockwise to counter-clockwise operation can be made in about two minutes. Designed for handling bars, rolled shapes, extrusions, and tubing up to 1 1/4" O.D., the machine features economical, quick-change tooling, smooth, hydraulic operation, and degree-of-bend turret selector. Typical production speed is 300 to 400 bends per hour.

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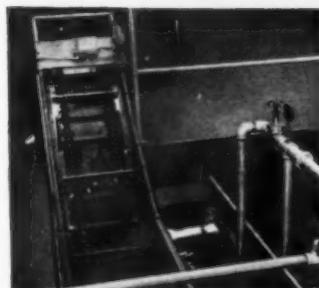
Fairfield Manufacturing*

*LAFAYETTE, INDIANA

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Fairfield has benefited several ways through the Delpark Filter. Gear finish has been improved, machine productivity has been increased and maintenance time reduced.

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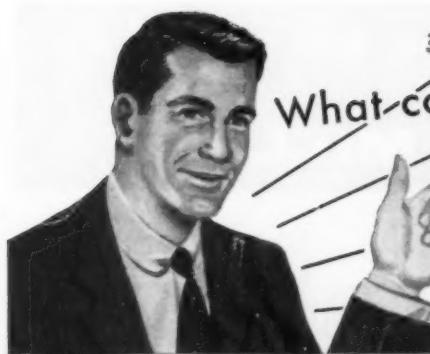
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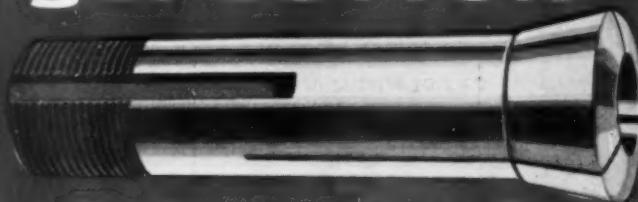
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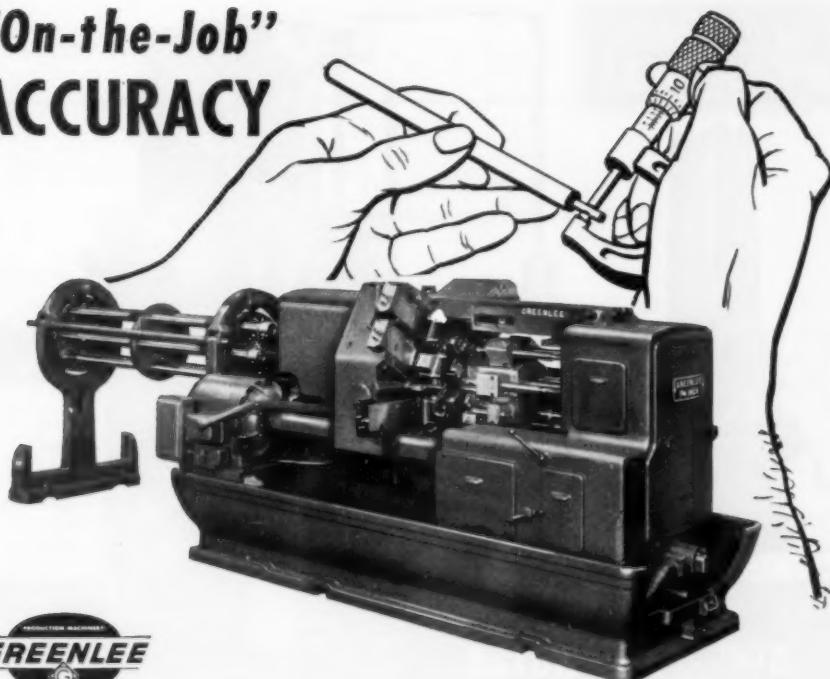
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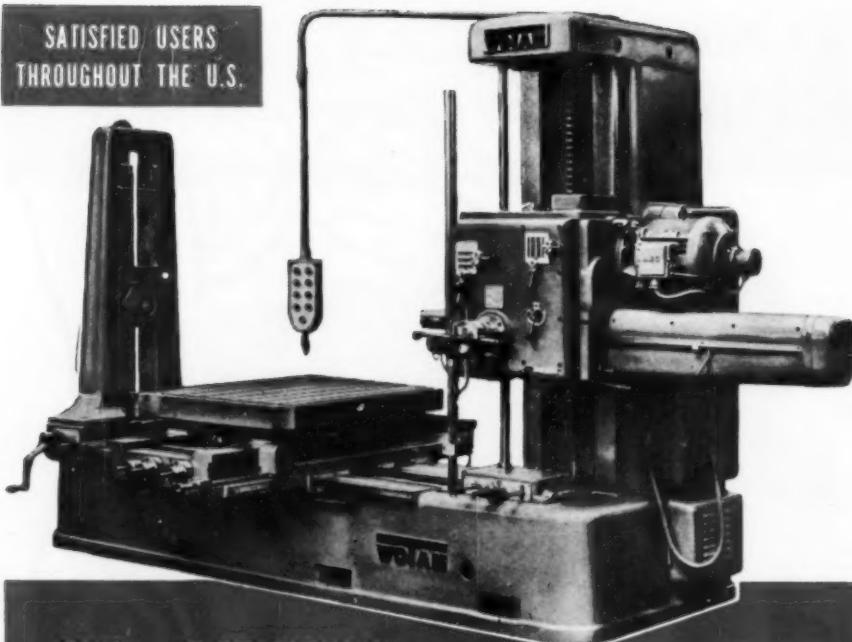
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Quick Change Spindle Taper

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Argument for Co-operative Education

To meet future requirements for sufficient, well-trained engineers, it's plain to see that what is needed is more students, more instructors and expanded facilities.

The co-operative education plan appears to have the best possibilities of solving the problem. It could be more of a force in alleviating the technical personnel shortage than it is today if the benefits it affords to industry and the youth of America could be publicized more completely and accurately.

Take the supply of available students, competent to assume a college course. It has been said a plateau has been reached. This is not borne out by Dale Wolfe's report of "America's Resources of Specialized Talent." Among high school graduates having an I.Q. of 120 or above, 57 percent do not go on to college. Whatever their reason—lack of motivation at the proper time or financial reasons—the fact is here is an untapped resource, because many would choose engineering or science as their vocation.

If finances are a problem among many of these 57% of bright lads, certainly the ability to earn while learning, which the co-op plan affords, would lighten the financial burden.

What can the co-op movement do to alleviate the shortage of qualified teaching personnel and insufficient

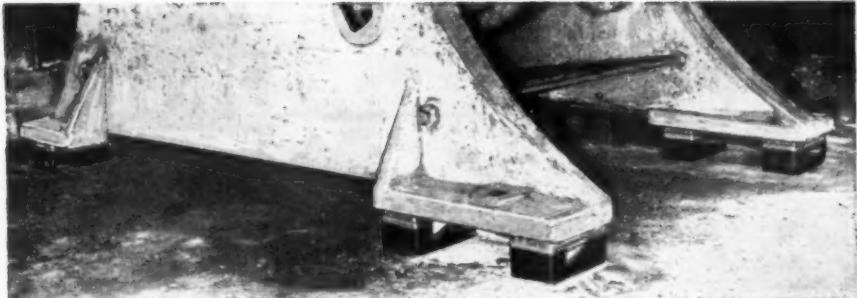
campus facilities? It's as simple as this: If out of a thousand students, only 500 are on campus at one time because of the work-study arrangement, the faculty is involved with no more than 500 students at a time. You need less facilities for 500 people than a thousand.

Perhaps, the majority of students may be better off with the standard four-year college curriculum. However, the advantages of placing a student in an environment of men who represent the type of person it is hoped the student will become are many. This is especially true for the high school graduate who otherwise would be taking the first high paid unskilled job offered him.

As there is an apparent lack of interest in higher education in many homes, the benefits of the co-op plan should be circularized in this direction.

More college buildings are going to be built and more scholarships will be offered to deserving students. But the best answer to getting the best out of what we now have in college facilities and teaching staff is the co-operative education movement.

—PAUL A. MELINE,
Managing Editor



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Most machine tools require only 4 WEDGMOUNTS.

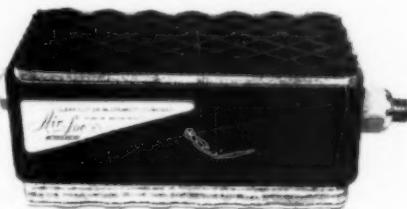
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Features This Month



- Tooling Know-how Pays Off at Hupp Aviation** **Page 101**
Numerical vs. Tracer Control **Page 114**

Tooling at Hupp Aviation. Plants producing precision parts on a small lot basis often have to be content with general purpose machines. Here are three examples of how skill and resourcefulness solved problems of machining a cast iron gear housing, tapering involute teeth on a spur gear and the designing of a special fixture to hold a bearing support with a flange thickness of only .080" to .100" held within a negative allowance of .002" in parallelism and flatness. There is also a discussion of how Hupp made a more efficient application of tools in turning a cluster gear blank.

Page 101

Numerical vs. Tracer Control. Will tracer controlled machines be displaced by numerically controlled machines? There's much discussion circulating to this effect. The author, Carl B. Perry, supervisor of plant engineering at Douglas, believes the tracer control concept has areas of application where it will compete favorably even with highly developed numerically controlled systems.

Page 114

Building a general purpose spotwelding machine. The works manager of a Swedish firm where the main factory operations are welding, sheetmetal and heavy steel plate work, tells how they eliminated some disadvantages they experienced in using standard spotwelding U-tongs by building a machine in which the bottom electrode consists of a 55' x 8' copper plate. **Page 128**

Gun drilling efficiency. Few shops are set up to do deep hole drilling. Furthermore,

few contract shops have the experience or equipment to do a good job. A Milford, Conn. firm has developed a program of experimental development and research to help customers with their drilling problems.

Page 133

Production fastening bottlenecks. Screw thread fasteners are often overlooked as a tool for paring basic production costs. Here are three case histories of how prominent companies solved their production fastening bottlenecks. By A. H. Mussgnug. **Page 137**

Automated horizontal boring machine. New, 4-spindle numerically controlled boring machine, developed by Barnes Drill Co. and General Electric Co. for GE's jet engine plant, has four spindles programmed to bore 248 holes in casing. It is designed to work on the periphery of cylindrically shaped parts with maximum diameters of 50 inches and heights of 40 inches.

Page 143

New drawing technique for producing aluminum cans. It is now possible to produce seamless can bodies with a depth up to three times their diameter in a single stroke. Cans can have walls as thin as .005".

Page 149

Self-locking mandrel. A job shop producing cast iron hubs originally inserted a tapered mandrel through the hub and secured by pressing the hub tightly on the mandrel in an arbor press. Now when they turn and face the hubs they use a self-locking mandrel.

Page 158

Meetings, Conventions, Exhibits

- Jan. 13-17—**Society of Automotive Engineers, Inc.** Annual Meeting. Hotels Sheraton-Cadillac and Statler, Detroit. Society headquarters, 485 Lexington Ave., New York 17, N.Y.
- Jan. 17—**Malleable Founders' Society**, Semi-annual meeting, Hotel Cleveland, Cleveland. Society headquarters, 1800 Union Commerce Bldg., Cleveland.
- Jan. 20-24—**American Institute of Electrical Engineers**, Winter General Meeting, Hotel Statler, New York, N.Y.
- Jan. 27-28—**Industrial Heating Equipment Assn.** Annual Meeting, Penn-Sheraton Hotel, Pittsburgh. Society headquarters, 1145 19th St. N.W., Washington 6, D.C.
- Jan. 27-30—**Plant Maintenance and Engineering Show**. International Amphitheatre, Chicago, Ill.
- Feb. 4-5-6—13th Conference of the Reinforced Plastics Division of the Society of the Plastics Industry, Inc. Edgewater Beach Hotel, Chicago, Ill.
- Feb. 6-7—**Malleable Founders' Society**, Technical and Operating Conference. Wade Park Manor, Cleveland. Society Headquarters, 1800 Union Commerce Bldg., Cleveland.
- Feb. 7-8—**American Society for Quality Control**, Annual conference on management by exception. Carter Hotel, Cleveland. Information: B. F. Goodrich Chemical Co., 3135 Euclid Ave., Cleveland.
- Feb. 16-20—**American Institute of Mining, Metallurgical & Petroleum Engineers**, Annual meeting, Hotels Statler and Sheraton-McAlpin, New York. Society headquarters, 29 W. 39th St., New York.
- March 10-11—34th Spring Meeting of the **American Tool Distributors Assn.** The Roosevelt, New Orleans, La. Information: Mr. Al Bourgeois, Convention Manager, The Roosevelt, New Orleans.

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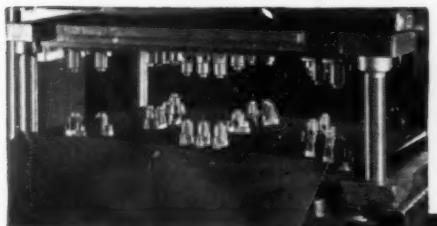
tooling versatility

keeps presses working, not waiting!

Nothing to mount on the ram, nothing to align or adjust — just place your Strippit setup in the press and start the run. That's how Strippit versatility pays off. Any good bench man can mount these independent self-contained punching and notching units in any template pattern within press capacity. New Strippit setups can be kept ready for the press, virtually eliminating down-time.

For flatwork, extrusions, structurals from the smallest gauge to 3/4" mild steel, Strippit gives you these extra advantages:

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- Each unit complete — permanently aligned, fully guided, self-stripping.



For unlimited feeding of work, Strippit Type CD and JD (heavy-duty) Punch and Die Assemblies are readily template-mounted to press ram and bed in any desired pattern.

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January, 1958



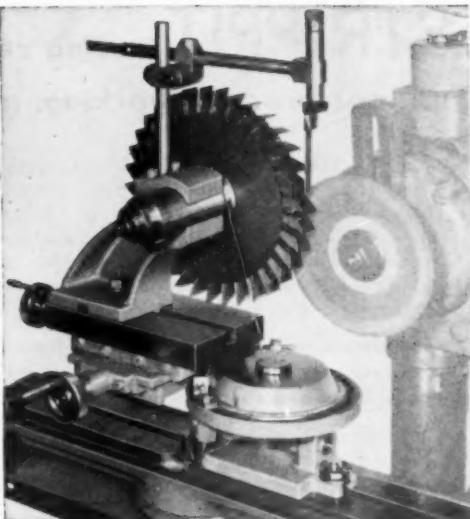
One of a complete line of Strippit vertical and horizontal hole punching units in capacities from the lightest material to $\frac{3}{4}$ " mild steel. Wide choice of die heights, shut heights and throat depths.

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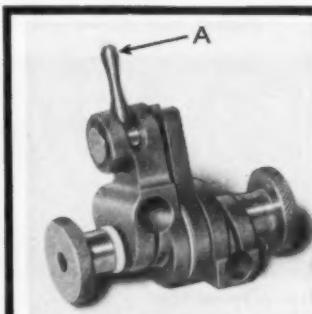
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This Universal Cutter Grinding Fixture fits any universal tool or surface grinder.



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Radial Grinding Fixture for sharpening fluted end mills with square, conical, or ball-nose mills. The index disc provides for multi-flute cutters.



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Letters to the Editor



. . . We were delighted with your very fine article on the spiral point in your November issue and are receiving quite a bit of response from it. . . .

John M. Mitchell, Adv. Mgr.
Cincinnati Lathe and Tool Co.,
Cincinnati 9, Ohio

Tool Box

Some years ago we had occasion to buy a Chatwin Polygon tool box from the Bradley Machinery Company, Detroit, Mich. To the best of our knowledge, this particular tool box is manufactured in England and Bradley was a representative. Now, we cannot locate the Bradley people in Detroit. Would you have any knowledge as to who distributes this item now? We thank you in advance for your kind consideration.

MELVILLE MILLER
PURCHASING AGENT
THE B. G. CORPORATION
Ridgefield, N.J.

. . . the address of the Bradley Machinery Co. is 4400 Conner, Detroit 15, Mich. The telephone number is VAlley 1-3341. The complete name of the company is Bradley Machinery Sales Co. According to their listing in the current 1958 Directory, they do manufacture a Polygon tool box and I am confident that if you contact them they will be able to help you.

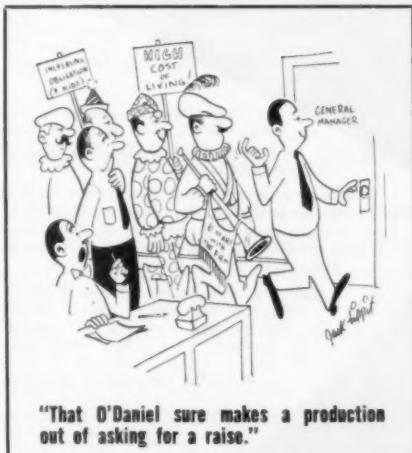
Spiral Point Drill

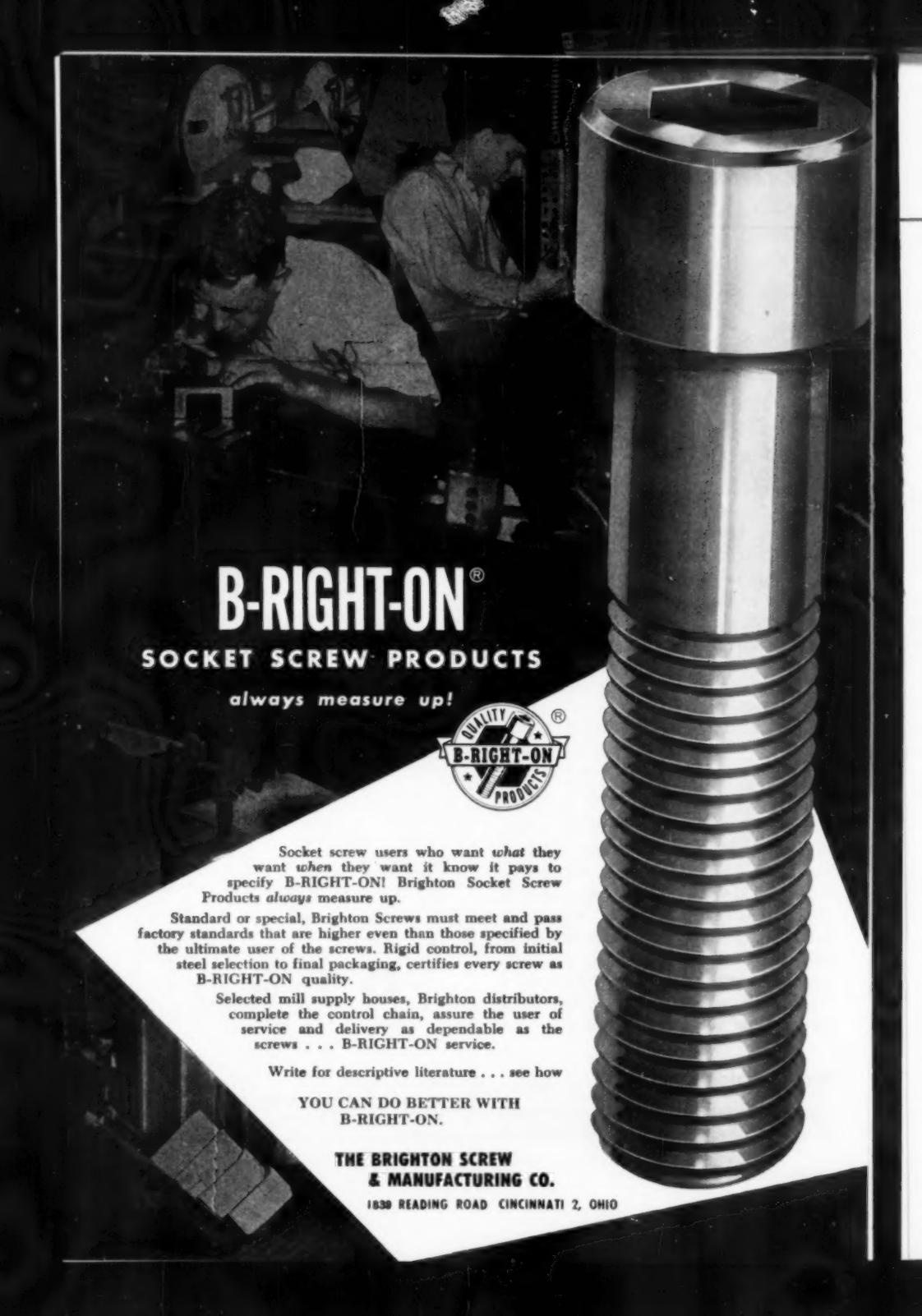
Having read "the spiral point drill" article in Machine and Tool Book of

November 1957, we are interested in finding out who manufactures the Spiropoint drill grinder and getting more information on this type of drill grinding . . .

GEORGE DIFENDERFER
PURCHASING AGENT
DOUBLE A PRODUCTS CO.
Manchester, Mich.

The Spiropoint drill grinder is manufactured by the Cincinnati Lathe and Tool Co., Cincinnati 9, Ohio.





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Lammot du Pont Copeland

Vice-President, E. I. du Pont de Nemours & Co.

Corporate and Excise Tax Cuts Ruled Out for '58

The Administration hopes to keep Government expenditures in fiscal 1959 near this year's \$72.5 billion. A balanced budget will be maintained partly through extension of present corporate and excise tax rates. Individual income tax cuts also have been all but ruled out.

The G.O.P. legislative leaders plan to have a White House meeting shortly before Congress convenes January 7, to go over the Administration's program once more. At this session, they will get a detailed account of what the President wants from the lawmakers in the fiscal year which begins next July 1.

The Soviet Sputniks have brought into focus our need to revamp defense programs. We must look for ways to cut spending in

other areas. Signs of considerable grumbling among Republicans over the cutbacks in civilian programs may be a reason for the session planned for January.

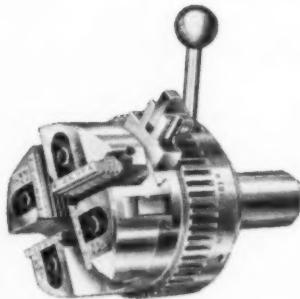
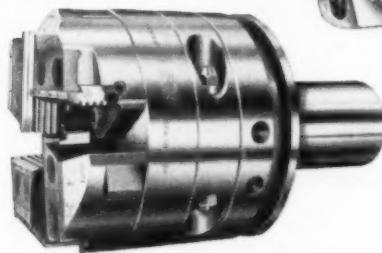
Senate Republican Leader Knowland had this to say about curtailing corporate and excise taxes: "In view of defense needs, I don't see any likelihood of giving up \$2.5 billion to \$3 billion in corporate income and excise taxes if present rates were allowed to expire on schedule."

Capehart Bill (S. 2427)

There's a way at hand to halt the hidden loan subsidies cutting into your tax dollar through seven major government lending programs. These subsidies seem to have remarkable growth powers. The Rural Electrification Administration, for instance, has reported that it expects to triple loans to co-

2

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LANDIS
die heads



maximum PRECISION or ECONOMY

"Threading Efficiency" requires the selection of the proper die head for the job to be done. To ensure that you may use the most efficient threading tool, LANDIS manufactures Die Heads in two basic styles:

HARDENED AND GROUNDED Heads—for a high degree of thread-cutting accuracy (Class 4 and Class 7 tolerances).

HEAT TREATED Heads—for commercial threading (Class 2 and Class 3 fits), with low initial cost and wide range coverage.

LANDIS Tangential Chasers are an important factor both in the economy and precision of these basic head styles—of which there are more than 100 standard and special sizes and types for use on threading machines, turret lathes, tapping machines and bar automatics. Send specifications and ask for Bulletins F-80 and F-90.

LANDIS *Machine* company

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continued

operatives by 1975. They totalled \$300 million in fiscal 1957.

REA borrows money from the government at two percent and lends it to the co-ops for two percent. But the government pays three percent for the money it borrows to lend REA. The other programs operate in a similar manner.

The proposed Capehart bill provides that all federal lending agencies must be charged interest rates which cover at least the government's cost in borrowing the money. The National Chamber of Commerce will support it at hearings in January before the Senate Banking and Currency Committee.

Armed Services Expenditures

The armed services have ignored opportunities for vast savings in military supply and personnel activities, and yet have deactivated certain operational forces that are essential to adequate defense, the Chamber of Commerce of the United States said recently.

An article in *Taxpayer's Dollar*, a Chamber periodical, calls attention to "widespread duplication and waste," and points first at the Army. In carrying out a reduction of personnel, the Army deactivated its famous First Armored Division. But so far, says the article, the Army's economy efforts have done nothing to eliminate the duplication in its seven technical services, each of which has its own supply system and its own administrative, legal, fiscal, and inspecting staffs. Such inefficient and costly management continues despite 10 years of pleading by Congress for a truly integrated military supply organization, the article notes.

Ellis Island Offered for Sale

Ellis Island, in upper New York Harbor, has been surplus to the needs of the Government since 1954. Previous efforts to dispose of it have been unsuccessful.

General Services Administration announced recently that it will give

"Should Your Plant Lease Production Equipment?" is No. 57 in the Small Business Administration's series of Technical Aids for Small Manufacturers. The leaflet discusses six advantages of leasing production equipment. Four major disadvantages are also discussed, along with terms and conditions of leasing agreements. Available without charge from any of the Agency's offices.

News from Washington

continued

"Consumer buying power should be strengthened by early adjustment of the federal tax structure to reduce the tax burden on the vast majority of American families in the low and middle income groups. The personal income tax on consumers should be reduced, and if additional federal revenues are needed, they should be raised, as a first step, by closing tax loopholes that grant special privileges to wealthy families and corporations."

George Meany
AFL-CIO president

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96

full consideration to all proposals for acquisition which have a constructive and worthwhile purpose. Formal proposals are not necessary at this time. Statements as to intended use and of the general plan will suffice.

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Tooling Know-how Pays Off at Hupp

Here are some examples of adapting standard machine tools to turn out precision parts on a small lot basis

By **Herbert P. Fields**, Manufacturing Manager
as told to **Darrell Ward**, Field Editor

• Metal working plants which produce aircraft and other precision parts on a relatively small lot basis usually have to be content with general purpose machines. Precision parts on short runs often make ingenuity a more valuable asset in the shop than large, expensive equipment. Highly specialized equipment under such conditions will not justify its cost. On the other hand, highly specialized equipment may be justified if and when its intended purpose can be applied to more than one specialized use.

At Hupp Aviation Division of Hupp Corporation in Chicago, a

leading producer of aircraft and missile components and assemblies, there are examples of both situations.

This division depends greatly upon the skill and resourcefulness of its personnel to perform many jobs that few plants would undertake. In some instances, the results have turned out better than results on the same part made with newer and more expensive equipment elsewhere.

Typical of this is a cast iron gear housing made by Hupp for the M-48 tank. The part is a malleable iron casting approximately 12" wide by 19" long and 13" high.

1. Gear Housing for M-48 Tank

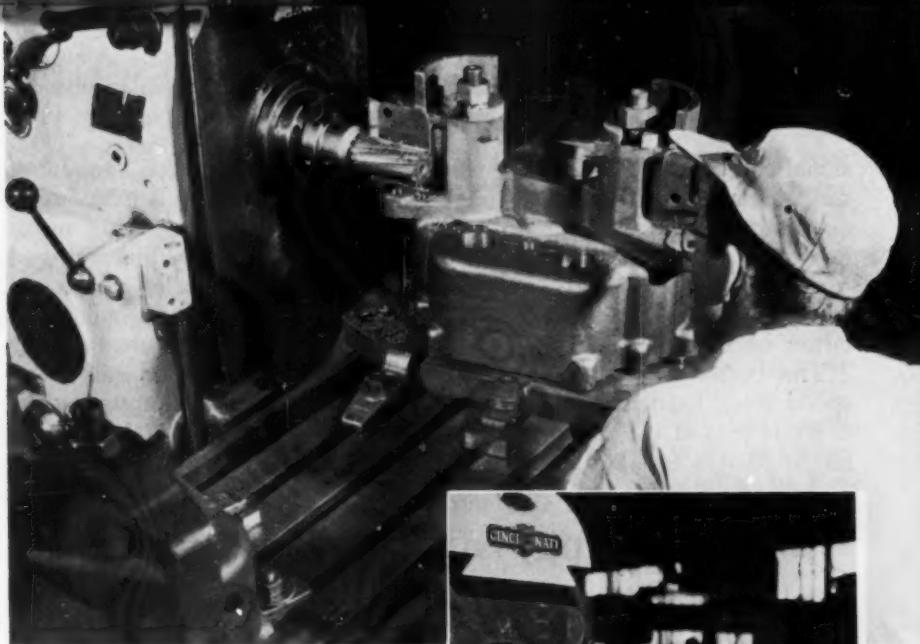


Specifications called for milling two concave faces of 3" x 3" mounting pads on a 42.500" radius, plus .010", minus .000". These dimensions fix the center of the turret ring gear and drive pinions. The job had been done previously in another plant on a tracer milling machine, requiring numerous light cuts, and employed eight expensive fixtures.

At Hupp there was no machine in the shop large enough to machine these milled faces in the usual manner, since they were 16" on centers and had to be formed within tolerances specified. Why not try a milling machine? A concave milling cutter was ordered

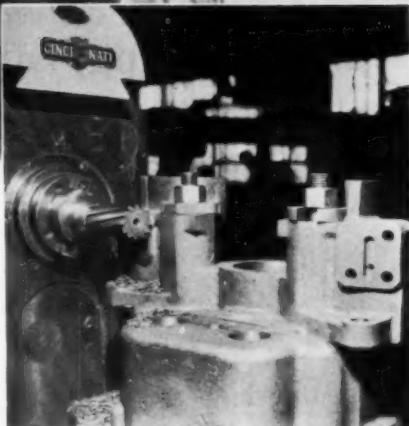
from Illinois Tool Works, spiral fluted and form relieved, to match the arc of the radius specified. This would hold the curve true and permit numerous sharpenings of the cutter. See illustration.

The next problem was to locate the work piece so that the segments of the arc (bosses) had equal radius and a common center after milling. Fixtures were designed for holding the housing on the table of a Cincinnati No. 4 milling machine. The fixtures are made with locating dowel pins which fit borings used for locating previous operations. Two such fixtures are used on the table of one machine, one in a right hand position, the



Two fixtures are used on a Cincinnati mill, one right hand and one left hand for cutting the two bosses alternately.

Concave form milling cutter faces mounting pad boss on gear housing. Both bosses are cut concentric to a $42\frac{1}{2}$ " radius.



other in a left. The illustration shows how the fixtures are keyed and locked semi-permanently to the mill table, eliminating frequent setups.

On an original set up, the operator takes a trial cut to test for position. Then, he removes the work to another fixture equipped with dial indicators. The checking fixture was designed to reduce the mathematical functions of the circular arc to a simple procedure of

making the dial read .000" at the center of a mounting pad face and roll off to .012" at measured distances each side of center.

If the roll-off of each side of center is the same, the operator knows the work is centered in the fixture on the mill and his next cut can be taken to finish the face. If one side indicates more or less roll-off, the milling fixture or the milling cutter must be corrected.

Once the set up is made, occa-

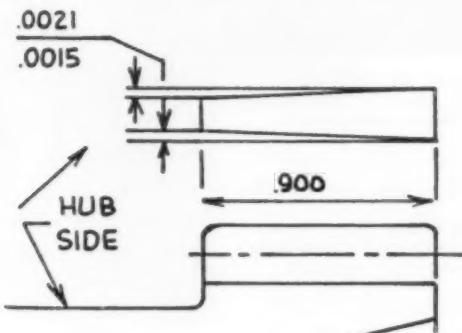
sional checks are all that are necessary to maintain tolerance. Perhaps one part of every 10 or 15 will be removed to the checking fixture for inspection. Usually, no change will show until the milling cutter becomes dull.

The cutter is of standard high speed steel, hardened to Rockwell C 63. It runs at 188 rpm with work fed at 3% ipm to take the $\frac{1}{8}$ " depth

of cut on the 3" x 3" mounting pad faces. Each boss is milled separately, with cutter turning on an axis tangent to the radius and work fed vertically, parallel to the cut. The work is switched from right hand to left hand fixture for alternate cuts on the same mill.

Savings with the improvised set up amounted to \$3,500 and time saved was about 40 per cent.

2. Generating Tapered Gear Faces



Another unusual job was one for which no special machine is made. Pure ingenuity was the only method for solving the problem which came in the form of a precision gear. Specifications called for involute teeth whose face must taper .002" on each side in a length of $\frac{3}{8}$ " instead of the standard spur gear pattern in which all elements are parallel to the gear axis. At the same time, the involute shape

had to be maintained within the tapered space between teeth.

This was no simple problem on a 27 tooth gear with spur ground profile, 10 diametric pitch, unground fillet and 20° pressure angle. Form grinding would not work. This would generate changes in the base circle.

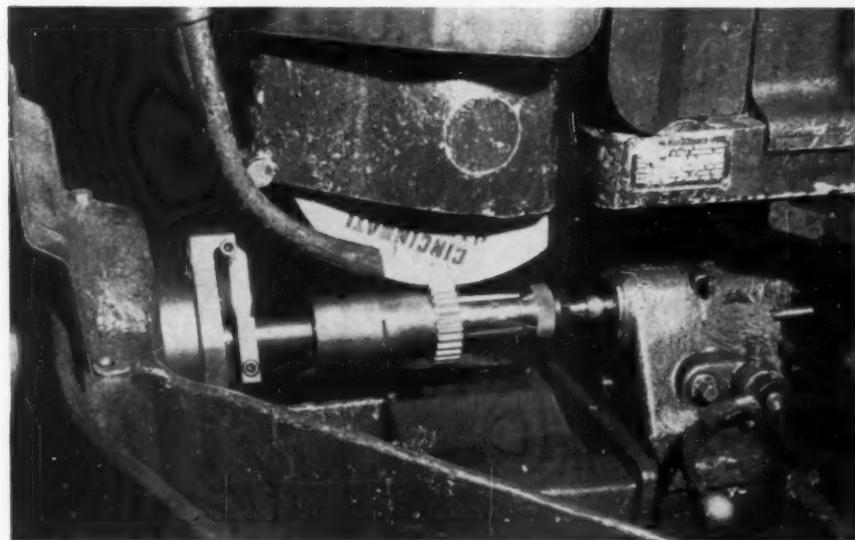
The first method tested was to swing the table on a grinder to give the required taper, grinding

one side of a tooth at a time. But, as the grinding foreman said, this was like grinding two gears instead of one. After one side of the teeth was ground, the bed had to be swung to the other side for the second grind. Of course, in practice, the method was to grind one side of all teeth of all the gears in one batch. Then, the table was reset for making the second grind.

A simpler method was devised for use on a Pratt & Whitney gear grinder. Since the machine generates an involute from a master gear and rack, and since a true involute had to be maintained, it was obvious that a taper would be produced on the land of the teeth if the tailstock was raised to tilt

the arbor holding the part. The involute was relieved by previous hobbing, so the under cut root would not be affected by the slight tilt required.

The solution was obvious enough, but it was not easy. First, a shim had to be made to elevate the tailstock the exact amount necessary to give the proper angle between the axis of the arbor and the horizontal plane. The shim had to be tapered, itself, in order to have the tailstock center tilted to the same axis as the arbor. This was accomplished by calculating the thickness of the shim stock beginning on a datum line projected down at right angles to the tailstock center. Then, based on the



Gear mounted on arbor in Pratt & Whitney gear grinder with tailstock raised to produce taper in gear teeth.

TOOLING AT HUPP continued

taper required, the shim stock was taper ground to align the center.

However, when the tailstock was raised by the shim it was thrown off center in the vertical plane because the tailstock had a tapered keyway on one side and a tapered gib to snug it into alignment from the opposite side. A new gib had to be made, thinner than normal, to allow the tailstock to be raised into vertical alignment.

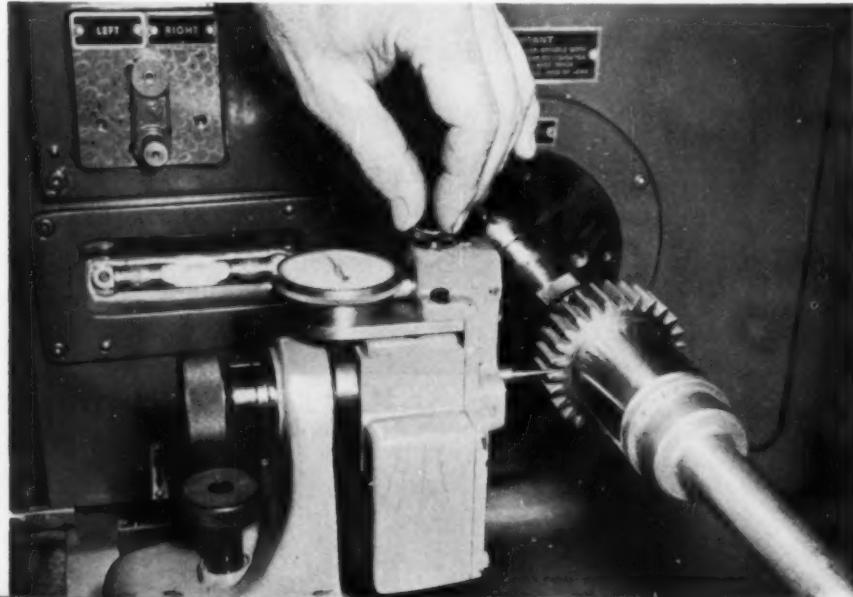
Alignment was checked with an indicator mounted on the arbor to read the angular deflection of the driver face plate in relation to the arbor axis. By indicator readings converted to trigonometric functions of the arbor axis, the operator was able to determine when the axis was true in the ver-

tical alignment and when the proper tilt was made in the horizontal. Once the set up was established, the operator locked up the tailstock and let it remain for the duration of the run.

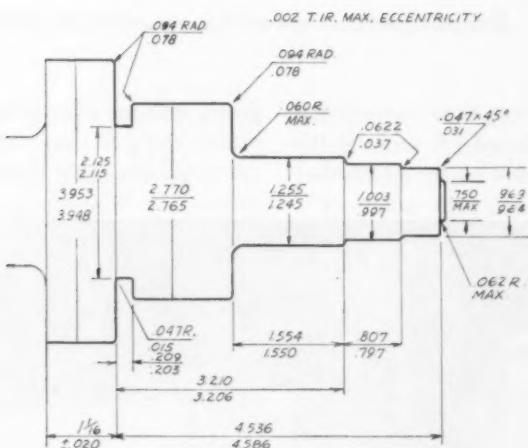
This technique enables the operator to maintain correct tooth thickness and taper to a tolerance of .002", involute to .0005", and a total composite error of .001". Finish required is 32 rms on the work piece made of AMS 56200 analysis, carburized and hardened to Rockwell C 60-63.

The wheel used on the Pratt & Whitney is a 12" x $\frac{1}{4}$ " x 5", E face, aluminum oxide, 60 grit, J hardness run at 7500 sfpm. Coolant is Socony-Vacuum CD 751 AF.

Taper in gear teeth is checked with indicator which gives direct reading of horizontal taper compared with axis of gear. Taper must be .002" from one end of gear to other.



3. Improving a Gear Blank Operation



Another gear problem was that of turning a cluster gear blank on a New Britain GF tracer lathe. The part is made of AMS 6215 analysis. Five different diameters are cut with the horizontal tool and one groove cut with the overhead. The cuts range in depth with stock removal varying from $3/16''$ to $\frac{1}{8}''$.

In this instance, the problem was not a special adaptation of machine and fixtures but one of efficient application of tools. Carbide inserts are used for both cutting positions, but in spite of "babying the machine" by taking lighter and slower cuts than normally recommended, production rate could not be brought up higher than about 7 pieces per hour. Broken tools and accompanying down time were a serious problem. The question was whether or not the contract

could be fulfilled. Schedule called for a nominal rate of 14 per hour.

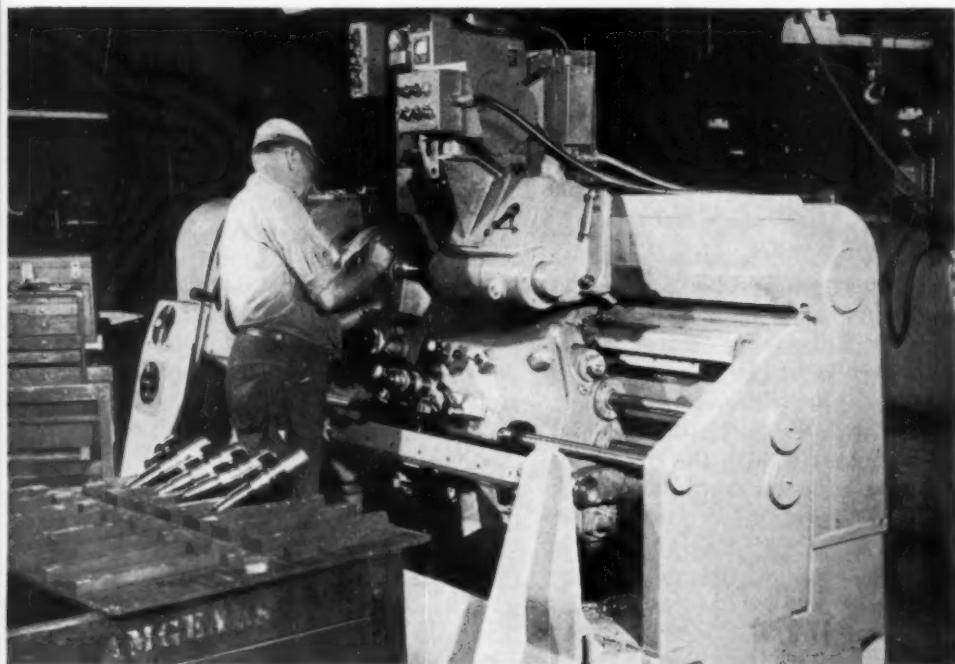
The operation was being run at 300 sfpm but there was constant squealing, chatter, material tearing, and tool breakage. Tool damage was so great that only 6 to 7 pieces could be turned between grinds. Grindings per tool varied anywhere from 1 to 5 for the horizontal profile tool inserts and a maximum of 125 for the overhead grooving tool insert. Feed rates were .014" ipr for the horizontal and .004" ipr for the overhead.

Either the cuts being taken were wrong or the carbides were wrong for the set up. When reduced speeds and cuts did not seem to be the answer, they tried several brands and grades of inserts. Nothing seemed to help. Tools would

Deeper cuts, stepped-up speed and feed rates results

break and down time would eat into production until it seemed the schedule couldn't be maintained.

from 300 to 435 sfpm. Feed rates were stepped up from .014" to .020" all the way through the pro-



Speed and feed rates were upped on the New Britain on a cluster gear blank operation.

In final desperation, the operator took the suggestion of the New Britain demonstrator who said, "Ram it in for the full cut and rev it up about 50% faster than you've tried before!"

The spindle speed was boosted

file for the horizontal tool and from .004" to about .007" or .008" on the overhead grooving tool. Immediately, the problems seemed to disappear. The entire cutting was done quietly and smoothly. The tools began to give enormously bet-

better tool life and down time is cut in half on tracer lathe

ter life and down time was cut in half.

Inserts which formerly had to be reground for every 6 to 7 pieces now remained sharp for 40 to 50. While the horizontal tool used to stand from one to five sharpenings, it now could take 20 because there was less fracture at the cutting edge. Instead of a maximum of 125 sharpenings for the overhead tool, there were now 150 to 160 per insert.

With this tooling and the newly increased feeds and speed, the lathe easily met the scheduled production of 14 parts per hour and could conceivably produce many more should the company find it desirable to increase production at the expense of decreased tool life.

Here then, would be a good example of efficient tool use with one exception: Hupp, as other plants with a job shop type of operation, is more seriously concerned with tool life and tool cost than would be practical on a high production transfer line, say in Detroit. The reason given is that except for special form tools, the Hupp plant applies most tools to general purpose use the same as they do with the majority of their machines. Therefore, it is less practical to disregard cost of tools in

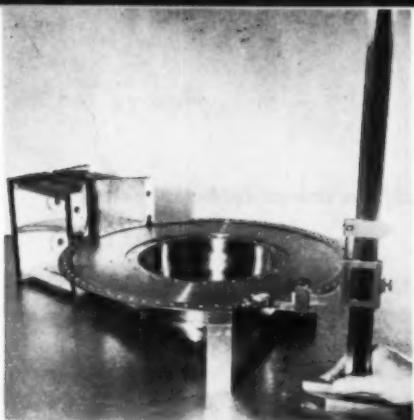
this shop for the sake of high production, at least to a lesser extent than theory would call for.

Realistic tool efficiency in mass production, of course, would disregard the cost of tools in preference to a comparison of the ratio of production rate and profit per piece to depreciation time rate of expensive equipment. This factor would hold until you reach such an excessive wear on tools that tool cost would approach machine cost per part produced.

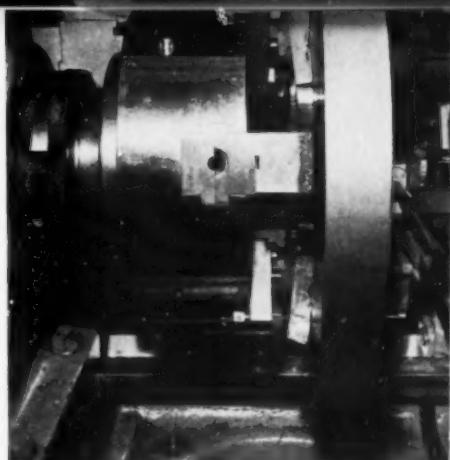
Unusual Piece of Turning

A 25" Lodge & Shipley tracer lathe, of which there are two in the Hupp plant, is one of the very few pieces of special equipment purchased for production of one type of part. However, production volume in this case justified the investment, particularly in view of the fact that the equipment is intended for use on many other applications in the future.

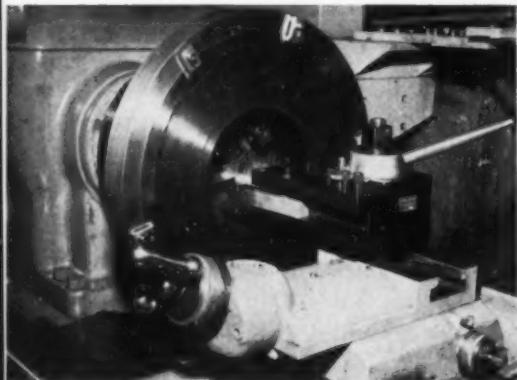
Significant in the current operations on the Lodge & Shipley is not the machine or its use, but a special fixture required to do an unusual piece of turning. The profile and cross section of the part is extraordinary for any kind of turning. It becomes more interesting in an automatic tracer.



Flange thickness of part: .080" to .100".

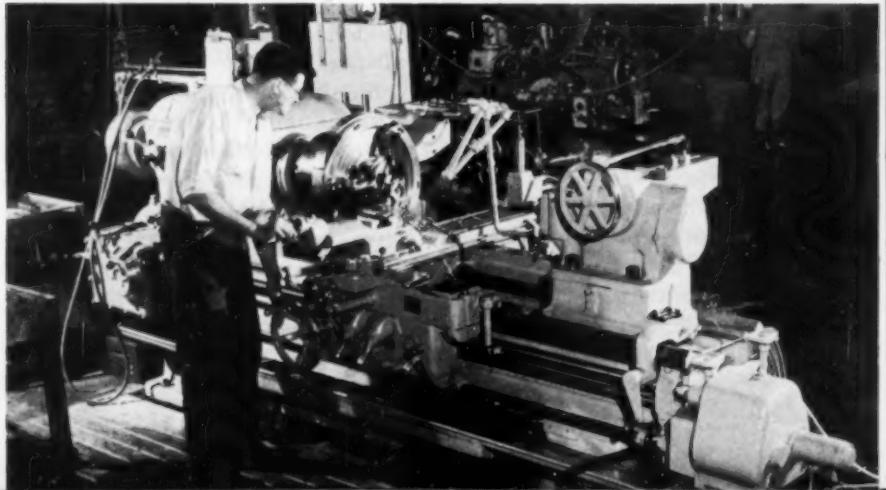


Cantilevered wedges are pushed outward against the chuck with adjustment studs and pull the work piece hub backward against the locating face blocks of the chuck.



The cut starts inside the hub of the work piece and backs out to the plane face of the flange. Then the tool cuts across the flange from inside out.

Special fixture on Lodge & Shipley tracer lathe is required to turn bearing support.



4. Holding Problem with Thin Bearing Support

The part is officially known as the J-57 bearing support. It looks more like a Mexican hat with holes shot in it around the brim and crown.

The material is AMS 6415 analysis, hardened to Rockwell C 26-32. The O.D. is 19.750" and the I.D. of the hub is 9.750", both held to plus-or-minus .001". These dimensions do not present any special problem. The real difficulty in the turning operation comes from a flange thickness of only .080" to .100" to be held within a negative allowance of .002" in parallelism and flatness.

Similar in action to a real Mexican hat being spun in the air, the design of this part permits too much flexibility in the flange area for any obvious chucking. Numerous methods were tried, including various devices for backing up the flange during the facing step. A special plastic chucking and back supporting fixture was made and put into use for a while, but all the problems could not be solved. Because the flange is so thin and wide, there was always a tendency toward chattering and whipping. The piece also would distort under

pressure of the tool and the accompanying heat developed from the cutting.

Finally, a metal chuck with special clamping and hub supporting devices was designed. Then, most of the problems were minimized to a practical level. On one machine, a chuck holds the flange plane side out with the hub turned inside the bore of the chuck. Clamps hold the outer rim of the flange. Centilevered wedges are pressed outward by adjustable studs against the rear edge of the chuck bore, pulling inward against the rim of the hub suspended inside the bore. This presses the hub of the work piece against positioning face blocks mounted on the chuck. Centering of the piece is controlled by a sliding fit tolerance between the outer rim of the work piece and the relieved outer face of the chuck.

The cut is begun on the inside bore of the work piece hub. The tracer follows the profile, backing out of the hub and moving across the plane face of the part. Once the tool and tracer are aligned, the operation makes a finish cut in one pass, removing .015" in-

side the hub bore and .020" over the flat face of the flange. The bore is turned at 188 rpm with tool feed rate of .010" to .012" per revolution. The flat face of the flange is turned at 94 rpm with the same feed rate, except for the inner relief face where a finer finish is

chuck although it still requires rigid support in process. (See below.)

Four separate cuts are made on this side of the work piece. First, the tool and tracer stylus are aligned with an indicator set block and the tool is backed off .010" from the finish dimension to take

Machining Hub Side of Bearing Support

Clamping fixture for turning the hub side of the Mexican Hat part. Fig. A shows milled rim of chuck for locating work piece from its O.D., and the internal hub support which is adjustable on the center stud.

The part is slipped into place, clamps are tightened, and internal hub support is adjusted to support hub without stress during turning. (See Fig. B.)

The clamping disc is installed over center stud to bring pressure against hub rim. Swing latch clamp is positioned and center stud is tightened to lock up complete assembly. Part is now ready for operation. (See Fig. C.)

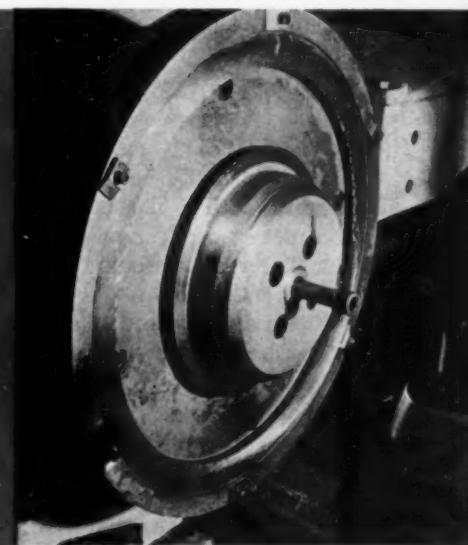


Figure A.

required. This area is turned with a feed rate of .005" to .006".

A different chuck of special design is used on another Lodge & Shipley for performing the next operation on the reverse side of the bearing support. This is the hub side, therefore the hub must project away from the face of the

the first rough cut over the face of the thin section up to the hub. The work is turned at 80 rpm with stock removal ranging from .040" to .050" at a feed rate of .010" per revolution.

Second, a rough cut is taken on the large diameter of the hub next to the flange. The tool is backed

off from finish dimension the same amount but the part is rotated at a faster speed: 159 rpm.

A third cut of ".010" is made to finish dimension over both areas, the face of the flange and the large diameter of the hub, both with the same tool in one continuous tracing.

The fourth cut is to finish di-

without lost time as soon as a tool becomes dull. Operators estimate approximately 40 to 50 grinds per tool and 20 to 25 cuts per grind.

At the time of this writing, Hupp is finishing the outer rim of the flange on a Blanchard grinder. However, through no fault of the grinder, they are having considerable difficulty in maintaining tol-

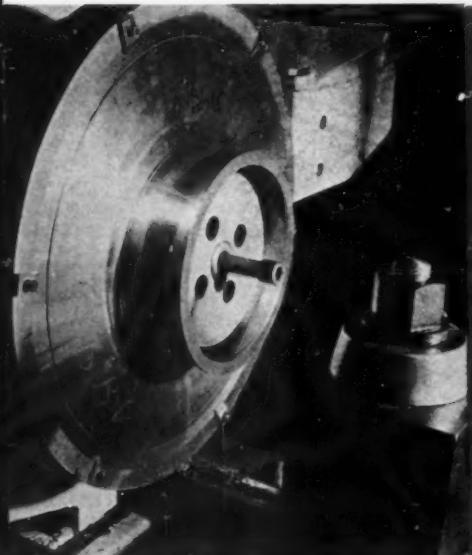


Figure B.

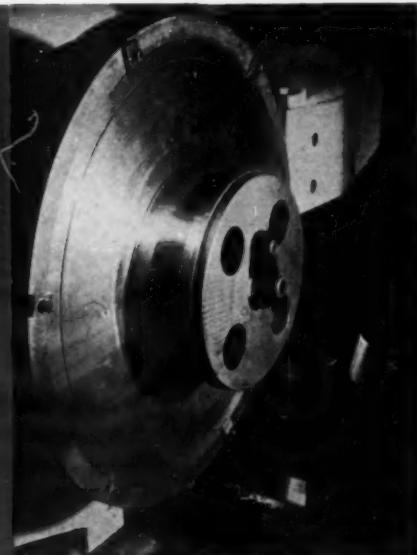


Figure C.

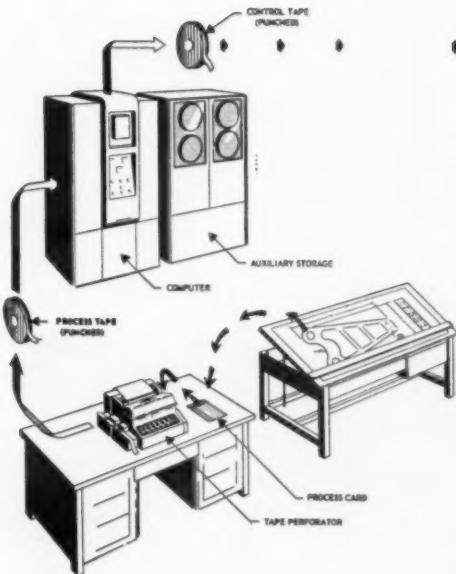
mension directly in one pass over the smaller diameter of the hub, radius, and rim adjoining the clamped face.

Tools used in these Lodge & Shipley operations are made to Hupp specifications with carbide tips. A number of spare tools are kept in stock for quick changing

erances in that part of the profile. Flexibility of the flange makes grinding a very serious problem. They are now in the process of developing a clamping spider which will mount on the hub of the part in the Lodge & Shipley lathe to press the flange back against the chucking fixture.

By **Carl B. Perry**
Supervisor, Plant Engineering
Douglas Aircraft Co., Inc.

Are tracer-controlled machines OBSOLETE?

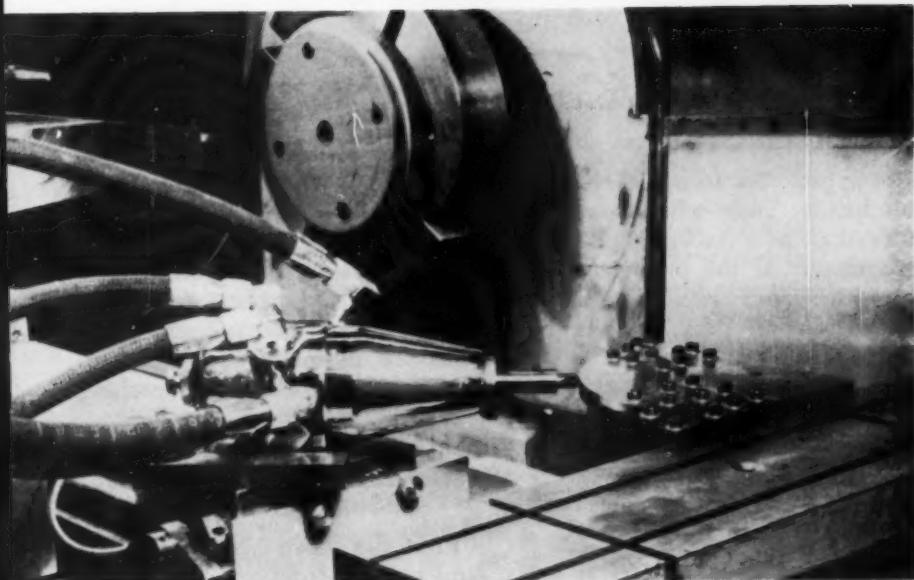


Is it just a matter of time before tracer controlled machines are displaced by numerically controlled machines? Or does the concept of tracer control have areas of application where it will compete favorably even with advanced and highly developed numerically controlled systems?

Numerica

• You may wonder why this problem of tracer vs numerical control has not been more adequately resolved to date. There are obviously many reasons such as the inherent complexity of the problem and the extremely varied conditions of application—but I think a more basic reason is poor communication between those who know the most about numerical control and people skilled in the art of machining.

The background that produces men who achieve a high measure of understanding and skill as ma-



Valve stylus in contact with template on tracer controlled lathe.

vs Tracer Control

chinitists is very different from that of the expert in the field of numerical control. Few persons well informed on the subject of numerical control have much understanding of the practical problems associated with the operation of machine tools—and the reverse is certainly true—that few experts in the machine operation end understand the potentials and limitations of numerical control.

In this age of specialization we are not expected to be experts in the other fellow's field. We need to gain a measure of understand-

ing of the other fellow's area, because he is trying to help us yet doesn't know enough about our special needs and problems. We need to bridge the gulf between the art of machining and this new science of machine control. We are talking to each other but we are not really understanding each other. We need to develop better means of communication.

To assist in gaining insight and to provide a basis for objective evaluation of the potentials and limitation of both methods of machine control, let us first review

Objective: To define conditions most favorable to each concept

both approaches from a theoretical standpoint. Then with these considerations as a background, let us look closely at the practical problems associated with various conditions of application. Our end objective will be to define conditions most favorable to each concept. From this base we shall attempt to draw some conclusions regarding the future of tracer machines.

System Theory

Both tracer and numerical systems of control may be viewed as means of supplying the machine with two distinctly different kinds of information, namely part geometry data and machine management data. In the case of a tracer machine, the template or pattern supplies part geometry information and the machinist supplies the machine management inputs. In a numerically controlled system both inputs are fed to the machine from a stored intelligence source.

The Significant Differences

From the point of view of system theory a numerical control system is different from a tracer system in two significant ways: one—the part geometry data is transposed from the engineering drawing to a form understandable to

the machine without the requirement for graphic representation and the bringing into being of a physical analog tracing medium in the form of a template or pattern. Two-machine management decisions are normally made and recorded prior to the work reaching the machine.

Theoretical Advantages of Numerical Control

From the above it is obvious that numerical control systems have two areas of potential superiority, namely the ability to provide part geometry inputs to the machine without the cost of templates or patterns, and the means of developing and delivering machine management inputs that will come closer to optimizing the machining process than can normally be obtained by an operator. It is these two areas of superiority and the very substantial assist provided by modern computers and associated data processing equipment that establish the foundation for the great potential inherent in numerical control.

Conditions Favorable To Numerical Control

This potential superiority is a variable depending upon the condi-

tions of application. By defining these conditions we are able to establish a basis for determining the appropriate scope of application. One or both of the following conditions must be present to provide an environment for the realization of numerical control potentials:

1. The cost difference must be great between producing templates or cams vs transposing the part description to the numerical intelligence storage medium.

2. The machining efficiency must be substantially improved by the application of higher level decision making and more sophisticated machine control than is normally obtainable through the medium of the machine operator.

In general, these two conditions are directly related to part complexity and it therefore follows that the "pay off" for numerical control is normally proportional to part complexity and machining time. Highly complex parts requiring dif-

ficult to produce and therefore costly templates and/or cams that require high floor-to-floor machine time, and that call for complex machine management intelligence—these parts represent the ideal application for numerical control.

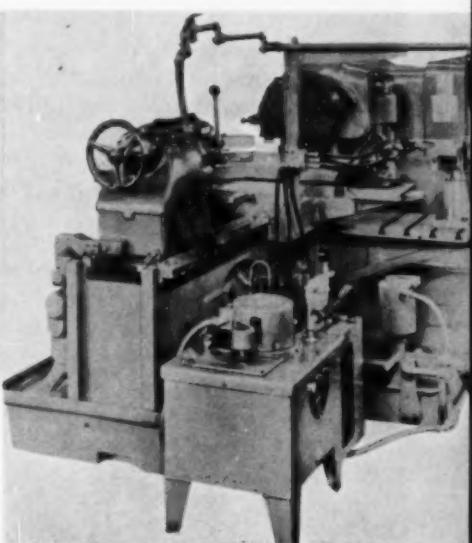
Conditions Favorable To Tracer Control

The concept of tracer control flourishes in a very different application environment, namely one in which physical analogs of part geometry (templates or patterns) may be produced easily and at low cost and good machine management can be achieved by an operator. In general then—the "pay-off" for tracer control is proportional to part simplicity.

(1) For example, frequent or continuous variation of feed rate required to optimize the machining process while cleaning out variably shaped pockets.

An ideal example of an appli-

Right end view of 25-inch lathe with high precision slides and an especially adapted one-dimensional hydraulic valve on the tracing equipment used on this work. Note very heavy template holder and hydraulic oil reservoir. Photo courtesy Union Carbide Nuclear Co.



cation favorable to the tracer concept is found in the tumbler lock key duplicating machines now frequently found in drug stores. These highly efficient mechanical tracers duplicate the profile of a key accurately, quickly, and with low operator skill requirement. Numerical control is no contender here because—one, the physical analog data is in being (costs nothing), and two, the machine management inputs are adequately provided by the operator. Non-complex parts for which templates or patterns can be inexpensively produced represent the best application for tracer control.

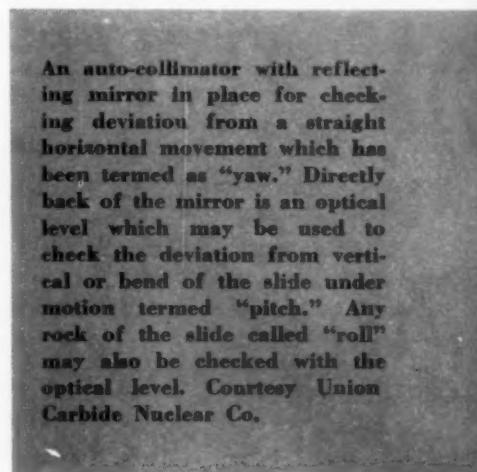
The Cost of Templates and Patterns

We have previously conceded a theoretical advantage to numerical control in matter of describing the geometry of the part to the machine. We referred to this as a theoretical advantage; in many applications, some or all template or pattern making operations either must be performed independent of the requirement or patterns are substantially reduced and frequently eliminated.

The following examples will serve to illustrate how frequently and under what varied conditions this may be a factor in reducing template or pattern cost:

Curve Fairing. Curves used in aircraft design and in many other industries are frequently defined by a series of coordinate points rather than by mathematical equation. Such curves must usually be graphically produced to establish in-between coordinates and fair as required. With modern photo transfer methods such in-being curves can be economically transferred to metal for the making of low cost templates.

Tool Fixture Design. The design of part holding fixtures that properly orient the part, provide adequate support, and yet offer no cutter path interference, frequently require that the part to be held must be accurately laid out.



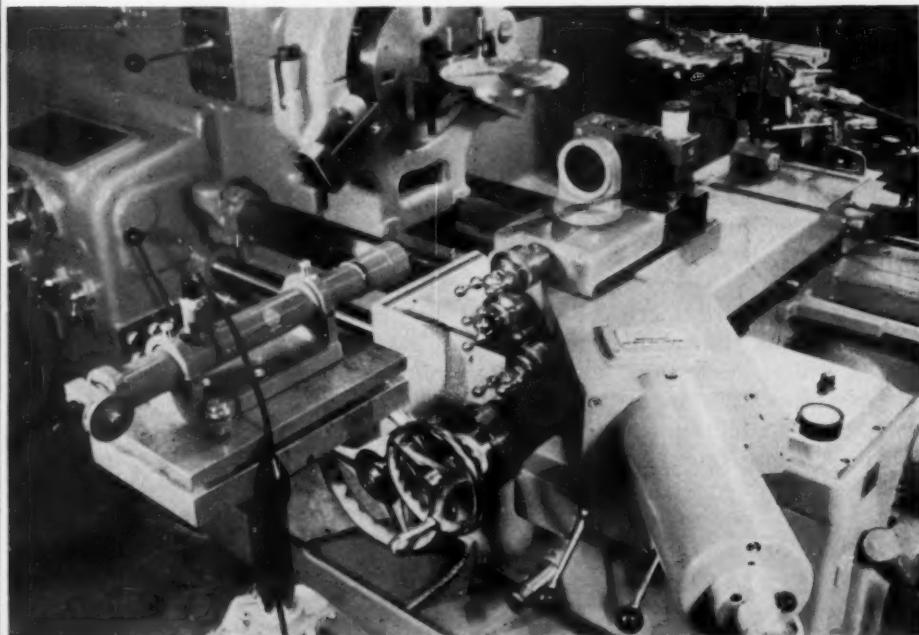
Hole Location Determinations. In the aircraft industry, for example, the location of attach holes is normally established by means of master line layouts in which attaching parts are graphically superimposed to arrive at optimum hole locations. Where such layouts are required, the graphic analog required to make the template is again in being.

Part Design—Functional. Models made to full or reduced scale are frequently required to develop optimum part configuration. This requirement may result from reasons such as resolving problems of interference and interaction with adjacent parts, experiments to evaluate alternate manufacturing methods, and to build functional prototypes for tryout and evaluation. Such models, are used to sink production dies, or to make produc-

tion parts. Here again tracer machines permit the geometry of part to be fed to the machine without any cost and time delay associated with intelligence transposition.

Part Design—Aesthetic. Here, in every case, a three dimensional model is made before shape becomes accepted. Copying the model is another obviously ideal application for the tracer concept.

Summary. There are many other design and development problems that are best solved by the creation of a model. The significance of the above to our deliberations is obvious. In all these cases, part geometry data is available for little or no cost if tracer machines are used. These same machining tasks could be produced by numerical control methods, but the cost of providing part geometry data to the machine is substantially higher.



What happens when you must predict the unpredictable?

Machine Management

General. Machine management inputs may be defined as all commands, instructions, or intelligence required by the machine in addition to part geometry data. Such inputs include: feed, spindle RPM, coolant on or off flow and type, start and stop of the various prime movers, pre-positioning of the various machine elements, etc.

Static and Dynamic Inputs. The above listing of some of the inputs required by the machine may be observed to fit cleanly into two distinctly different categories. The static inputs are the simple on-off and pre-positioning commands. These inputs are relatively insensitive to time and only base a broad sequence relationship to the dynamic positioning of moving machine elements. These static inputs in no way overtax the capabilities of a machine operator.

The dynamic inputs are those that base a precise relationship to the position of moving machine elements, and the phase of the machining process. The complexity of the part, or more specifically the rate at which the relationship between cutter and work changes, sharply effects the degree to which operator capabilities are taxed.

The Human Neural System. The

machine operator supplies machine management inputs in a remarkably efficient manner offering many advantages unattainable through the medium of numerical control, the most significant advantage being his ability to receive through his human senses, sight, hearing, and touch, unanticipated feedbacks from the machine, to process this information in relation to his years of experience, and to issue corrective commands.

But this wondrous neural system we humans possess has its limitations—it can only process one bit of information at a time, the rate of processing is limited, and response time to get effectors in motion is too slow, it gets fatigued, and sometimes it makes mistakes. The degree to which these limitations of the human neural system affect its use as a source for machine management inputs depends largely on the rate at which decisions must be made and executed. Let us see what this means in terms of types of machining tasks.

Operator vs Stored Intelligence. The operator is the superior source for machine management inputs *in all cases where decision making at the machine is an advantage.* He is a near equally efficient source in all cases where the limi-

tations of his neural system are not exceeded. Stored intelligence is the best source for machine management inputs wherever these two conditions apply:

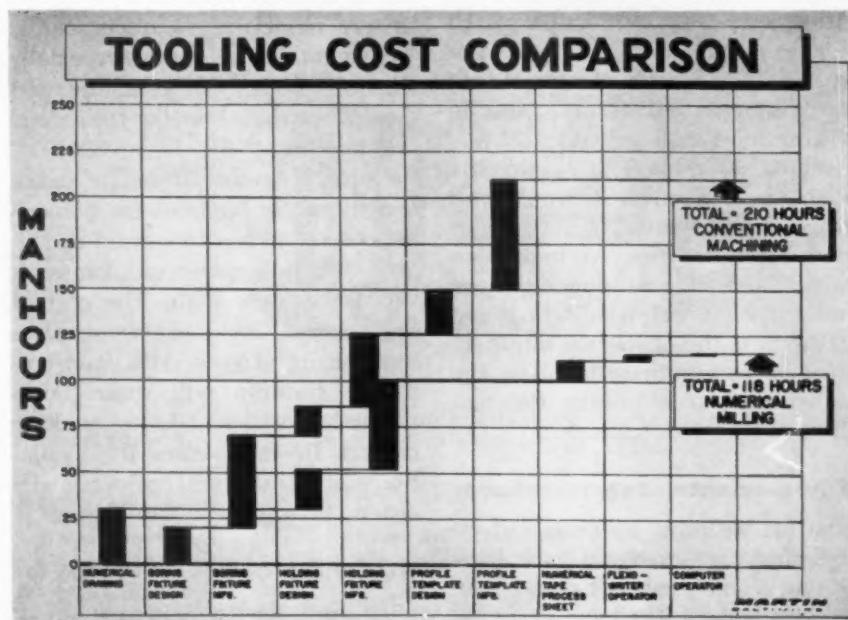
1. The requirement for decision making at the machine is not present.

2. Its additional cost is offset by the higher efficiency resulting from overcoming operator limitations.

The Unpredictable

Numerical control's domain of unquestioned superiority would be substantially larger if all the variables in the complex cause sys-

tems involved were controllable within closer limits. Take, for example, the physical properties of materials to be machined—despite every effort on the part of producers to achieve uniformity, as we all know, on many materials, the range of variation is disturbingly wide. Consider what this means to the machining process. Can any man predict the distribution and magnitude of residual stresses in complex forgings? And if we had a way to make such predictions, what about the variation from forging to forging and batch to batch? And yet the very essence of the numerical control concept



Complete tooling time on a typical aircraft part is almost halved by the use of numerical machining. Photo courtesy The Martin Company.

is that *machine control decisions be made before the work is on the machine*, and to do this you must predict the unpredictable or surrender all such parts to the domain of the tracer concept.

A large percentage of the profile work found in an average machine shop is relatively simple in terms of the machining demands imposed upon the operator. Now it is probably true that even on the simplest part an optimized stored intelligence program would effect higher part output than an operator manned machine. But the magnitude of this difference in efficiency is small on simple parts. For example: Suppose we want to scallop the web of a two foot long aluminum extrusion. Assuming all conditions equal except that one machine is numerically and the other tracer controlled, would you expect a substantial difference in total machine time to make ten parts? And if you conclude the numerical control would be more efficient, is the efficiency improvement of a magnitude to offset the higher cost of obtaining the machine management inputs?

Environmental Considerations

So far we have concentrated on exploring the strengths and limitations of each concept completely independent of the operating environment. There are some obvious factors in this area that de-

serve some serious consideration.

Skill and Facility Availability. The matter of availability of skills and facilities for efficient programming and data processing are imperative pre-requisites to efficient exploitation of numerical control. This fact alone may dictate a decision in many small plants to not exploit numerical control. Such shops will be using tracer equipment for many years.

Type of Machine Shop. The size of the shop, type of work performed, amount and complexity of profiling operations required, etc. are all factors that must be weighed in any numerical vs tracer study. In general small shops, especially the job shops, will conclude that tracers are their best bet for a good many years.

Capital Availability. The initial investment in facilities for numerical controlled machines and associated data processing and computer support is very high. The cost of preparation, including reorganization, hiring of new skills, and employee training will make additional heavy demands on working capital. In many cases the availability of capital will influence decisions favoring tracer machines.

Numerical Control's Potentials

To find the rightful domain of tracer applications we have probed for the "soft spots" in a vast area

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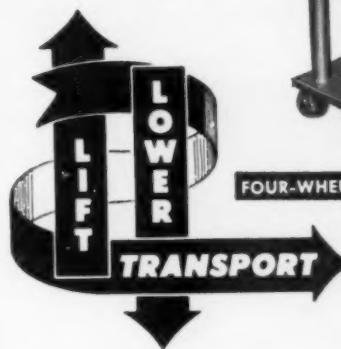
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of application laid claim to by numerical control enthusiasts. In so doing we exposed and exploited some areas of weakness, and this was a job that needed doing. Better to understand the deficiencies of this giant before we put him to work in the shops of America. But don't let the exposure of some weakness dull your appreciation of the tremendous potentials of this new technology. For make no mistakes about it, numerical control is here—and it is here to stay. Properly applied in its rightful areas it will result in a very substantial increase

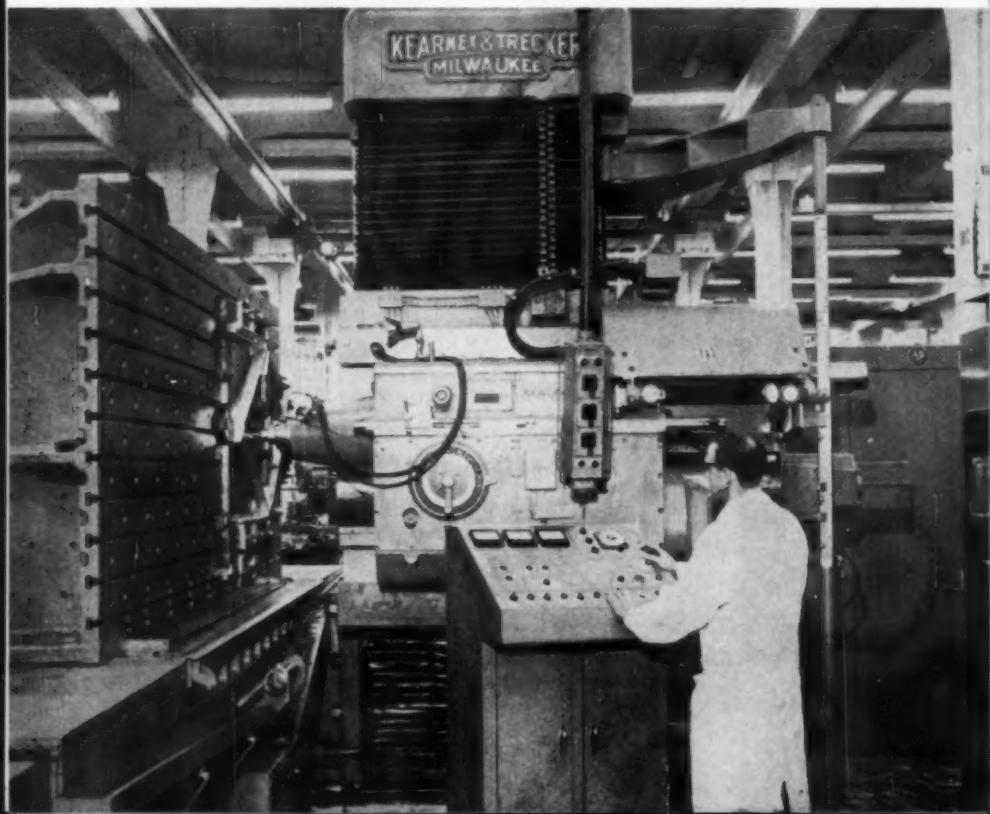
in machining efficiency and product quality.

Resume

The Communication Problem. Experts from both camps need to work harder at understanding the strengths, and limitations associated with the two concepts.

System Theory. The differences in the two systems that most significantly effect application decisions are: 1. Numerical control systems deliver part geometry data to the machine without the requirement for physical analogs. 2. A higher level of machine management in-

Numerically controlled milling machine which can mill one aircraft part in two hours compared to eight hours required by conventional machine.



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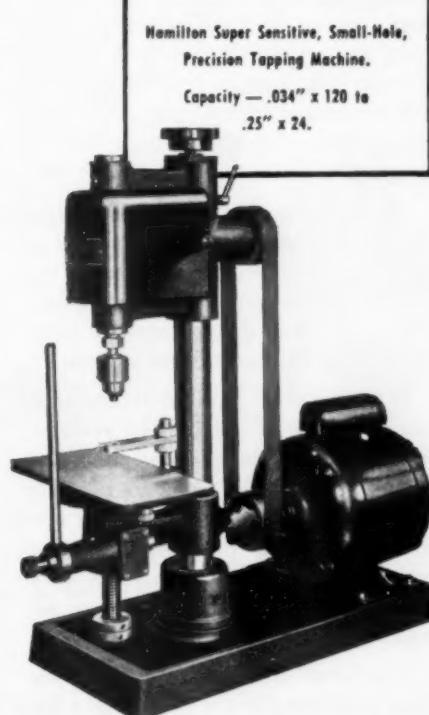
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Environmental considerations will influence decisions

telligence may be delivered to the machine by numerical control.

Conditions Favorable to Numerical Control: 1. Parts requiring complex and, therefore, costly templates or cams. 2. Parts requiring machine management inputs that exceed the capabilities of the human neural system.

Conditions Favorable to Tracer Control: Graphical layouts and/or models required apart from machining problem. 2. Simple machining tasks that do not exceed capabilities of human neural system.

The Cost of Templates and Patterns. There is a frequent requirement in the design and development of machine parts to produce graphic layouts and models for reasons other than providing part geometry data to a machine tool. Tracer machines in general are advantageous in these cases.

Machine Management. The nature and frequency of information demanded by the machine varies sharply with the complexity of the machining task. The operator is a good and adequate source for such intelligence so long as the limitations of his neural system are not exceeded. The generation of unpredictable machine or workpiece responses poses a serious problem for numerical control.

The Unsophisticated Part. A large percentage of profiling work is relatively simple. Such parts generally favor the tracer concept.

Environmental Considerations. Matters such as capital and programming skill availability, type and quantity of work to be performed, and job or line shop operations will influence tracer vs numerical decisions.

Time Phasing Consideration. Numerical control is in its infancy. As systems and machines develop and improve, more tracer equipment will be displaced.

Numerical Controls' Potentials. The underlying bases for superiority, lower cost of part geometry inputs and optimum machine management intelligence are completely sound. The potentials are so vast as to amply justify the full support of all who can contribute.

Summation

In the well equipped shop of tomorrow, you will find side by side the end products of technological evolution of two control systems, tracer and numerical.

• • •

Presented at the 3rd Annual Contour Machining Conference, sponsored by True-Trace Corp., Oct. 24, 1957, Los Angeles, Calif.

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January, 1958

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Report from Sweden:

Building a General Purpose Spotwelding Machine



By Olaf Lerson
Works Manager
AB Svenska Järnvägsverkstäderna
Linkoping, Sweden

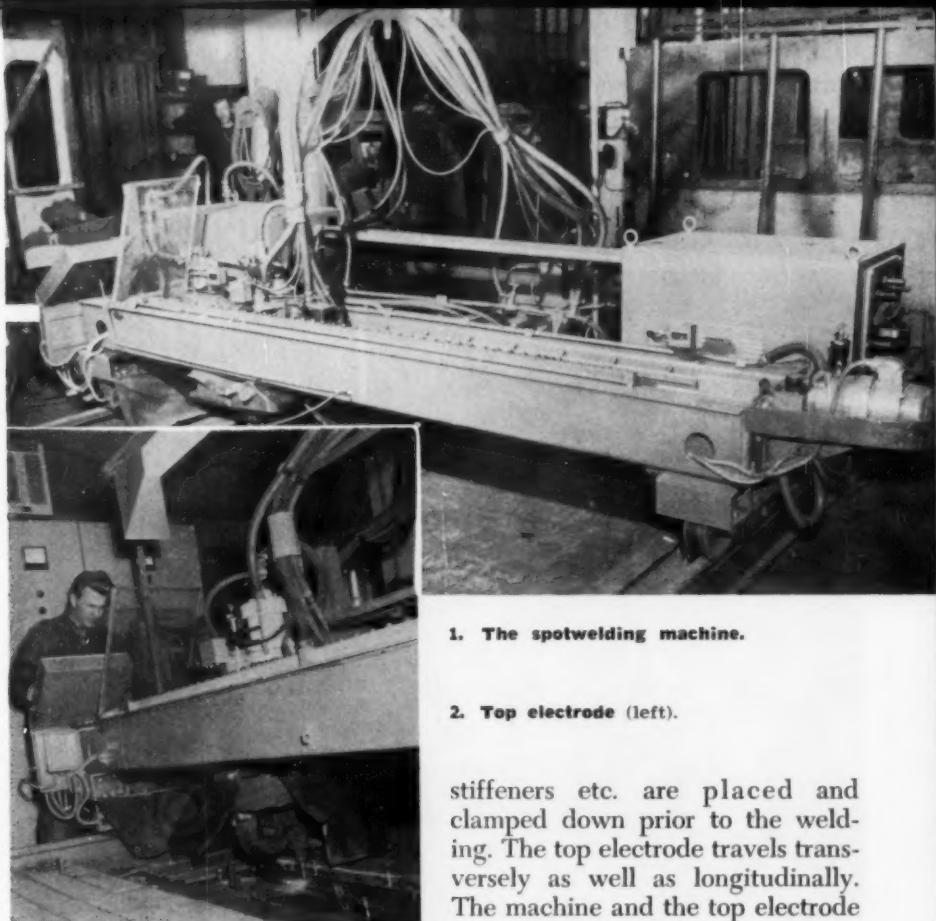
- Having a great variety of products going through our shops simultaneously makes a specialization of factory equipment difficult. But although we are compelled to use general purpose machines to a very large extent, a few examples will

This plant in Linkoping, Sweden, employs about 1,000 persons and produces such varied items as diesel powered railcars, hot water heaters, heat exchangers, gun carriages, etc. In addition, there are short orders of a job-shop nature. Main factory operations are welding, sheetmetal and heavy steel plate work.

illustrate how we still get the benefit of employing special purpose machinery.

For instance, subway and railcar beams, window sashes and different types of stiffeners are spotwelded to the sidewalls. Doors and frames are also spotwelded.

The necessary spotwelding operations on these parts were previously performed by standard spot-



1. The spotwelding machine.

2. Top electrode (left).

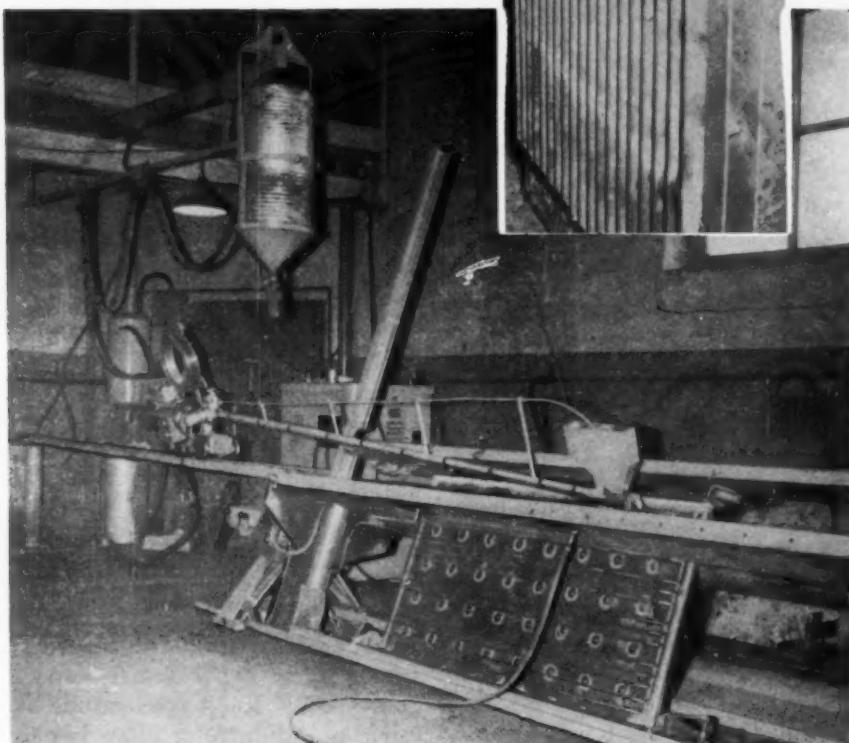
welding U-shaped tongs. These tongs were rather heavy and clumsy and operations required a great deal of time and effort. The electrodes left unduly deep marks at times.

To eliminate these disadvantages we built a spotwelding machine in which the bottom electrode consists of a 55' x 8' copper plate. On this copper plate the walls, beams,

stiffeners etc. are placed and clamped down prior to the welding. The top electrode travels transversely as well as longitudinally. The machine and the top electrode are shown in Fig. 1 and 2, respectively. Only one top electrode is used, as the operator often has to weld around corners, brackets etc., where two or more electrodes would make the operation complicated.

To the sections of our hot water heaters a great number of ribs are welded as is shown in Fig. 3. In an older method these ribs were first tackwelded to the sections and then finished by manual arc

3. Ribs are welded to sections of hot water heaters.



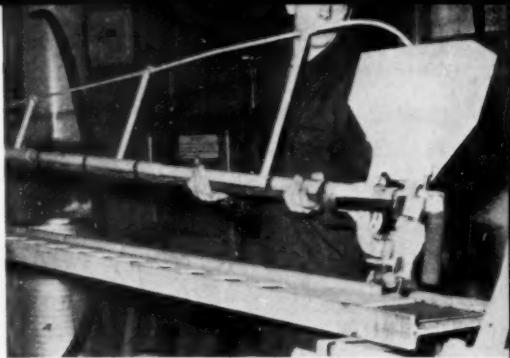
4. Fixture holds ribs securely against sides of section during welding.

welding. In Fig. 4 a fixture is shown in which the ribs are securely held against the sides of the section during the welding. The spacing is controlled by the fixture, which also tilts to a position suitable for the welding. The fixture is pneumatically manipulated and submerged

arc welding is used. All the tack-welding is eliminated and also much of the distortion due to the welds. The time necessary was cut in half by this fixture, which also may be used for other similar welding operations.

In Fig. 4 an arrangement is also

shown of the automatic welder, which in this case is a Union Melt machine. We found that the time necessary to set the work pieces or rather the groove or joint in parallel with the line of travel of the welding machine was comparatively large. To reduce this time-element we placed the nozzle of the machine together with a feeler wheel at the outer end of a 10-foot long arm. The wire is fed by the feeding mechanism from the wire reel through a small tube of nylon. The unused melt or flux is sucked up by an air stream about 3 inches back of the arc, and passed through a screen to a container. The 10 foot arm can be moved horizontally as well as vertically and follows easily



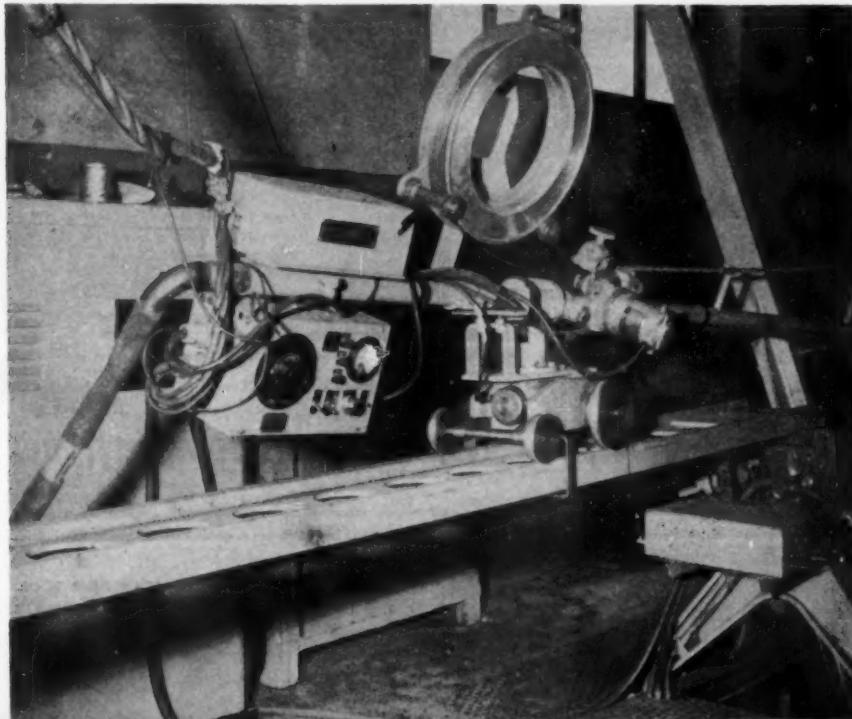
5. Nozzle of machine and feeler wheel are at outer end of 10-foot long arm.

the slit or groove. See Fig. 5 and 6.

The time necessary for setting the machine as well as the necessity of controlling the travel of the arc was greatly reduced if not entirely eliminated. All our automatic welding machines are set up in this manner.

• • •

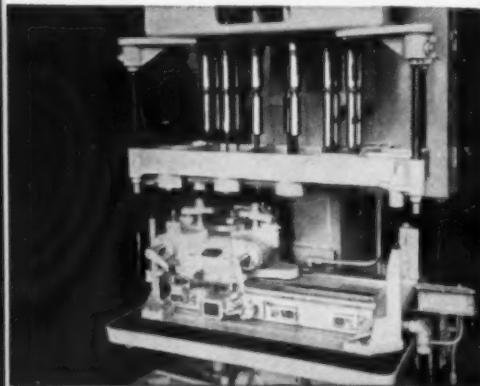
6. The machine proper of the automatic welding set-up.



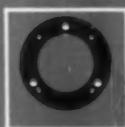
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Straight-line indexing on a Natco H6 produces 49 parts per hour. 4 holes drilled in first position, 3 holes drilled in second position, 4 holes c'bored in third position. One part completed every three strokes. Automatic cycling frees operator for other work. Illustrations below show three other ways of handling this part.

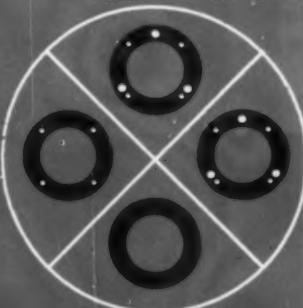


48 parts per hour. Inexpensive box jig. Operator positions jig under appropriate spindles. One complete part for 3 strokes of machine.



75 parts per hour. 3-position fixture. Operator shifts parts after each stroke. One part completed every stroke.

Multiple Drilling Operations on One Part-Face



186 parts per hour. Rotary 4-position index table. Operator unloads and loads while three operations proceed. One part completed every stroke.



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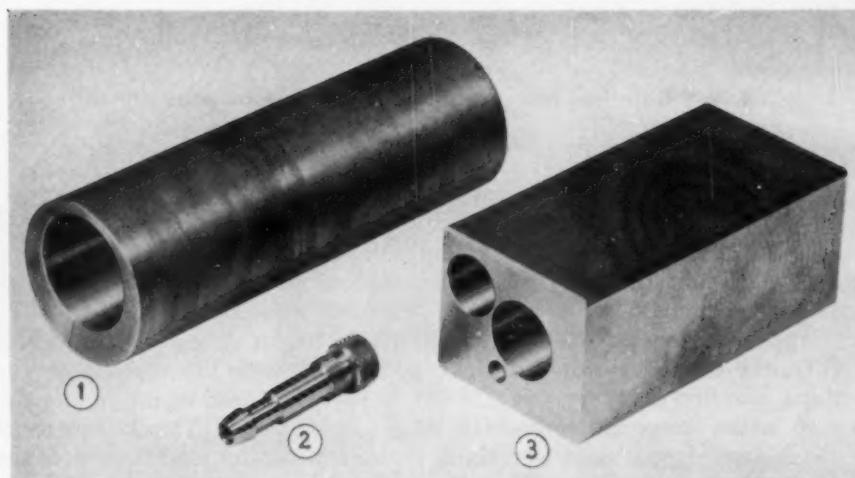


FIGURE 1.

For parts like these you need . . .

Gun Drilling Efficiency

• Manufacturers of products ranging from hydraulic equipment to automobiles are slowly but surely making greater use of deep hole drilling. One snag has developed, however: the fact that few shops are set up to do the actual deep hole drilling. Moreover, few contract shops have the experience or equipment to do a satisfactory job.

The Eldorado Tool and Manufacturing Corp., Milford, Conn., has a program of experimental development and research to help customers with their drilling problems. One firm that has benefited from

this program is the Hamden Deep Hole Drilling Co., Hamden, Conn.

Eldorado's engineers surveyed the Hamden plant layout and assisted owner Arnold Rawling in converting his standard equipment into specialized machinery. Since then, many nationally known manufacturers have come to depend upon Hamden for their deep hole drilling jobs.

One firm had been drilling an 18-8 stainless steel tube by the ordinary method and estimated the cost per piece at \$19.50. Hamden applied deep hole drilling to the same

A $\frac{1}{4}$ " hole has been held to a tolerance of plus .0005"

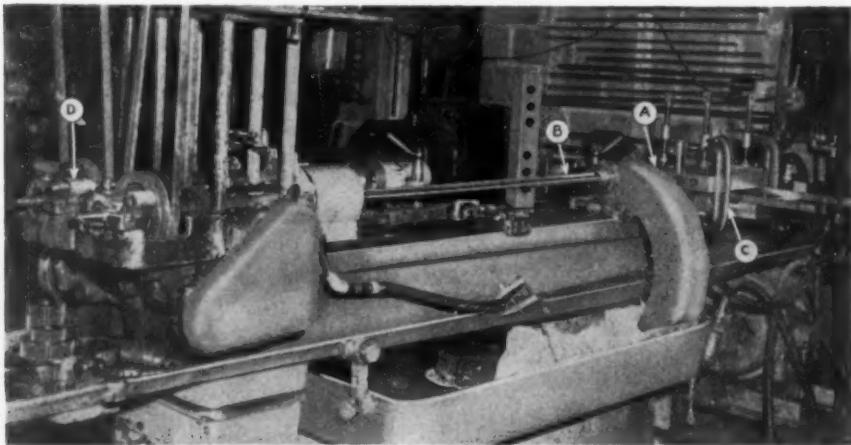
item at a cost of \$3.50, a saving of \$16.00 per piece. Hamden was able to accomplish this while holding well within the .002" tolerance as per specifications.

Approximately 20" long and 1 $\frac{1}{8}$ " O.D., the tube was drilled in three steps. The first diameter was 1-7/16 x 10 inches deep, the second, 1 $\frac{1}{4}$ x 9 $\frac{1}{8}$ inches deep, and the third, 1-9/16 to 2 $\frac{1}{2}$ inches deep. Hamden engineers developed a holding chuck to permit easy adjustment at one end while the other was held in a special adaptor. In this manner, one end was drilled, the tube reversed, and the other end was

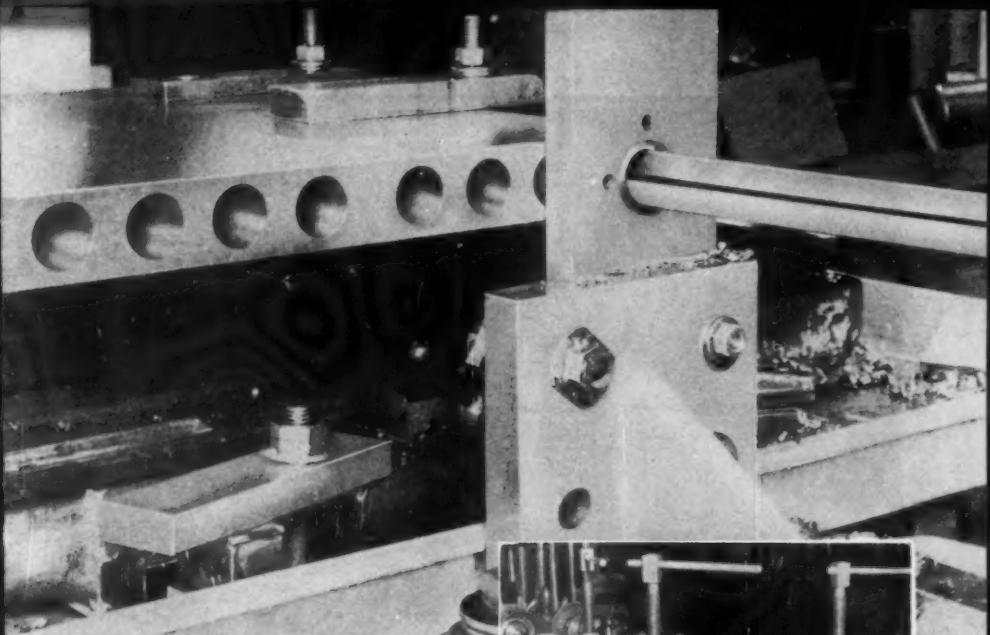
drilled. (See "1" of Fig. 1.)

Hamden's equipment has been adapted for jobs of a highly delicate nature. A $\frac{1}{4}$ inch hole has been held to a tolerance of plus .0005". Here, too, a special adaptor held the work with the threads on the piece being used as the holding or centering factor. Thanks to special pliers of wound lead to protect the teeth, not one was damaged during the entire job. (See "2" of Fig. 1.)

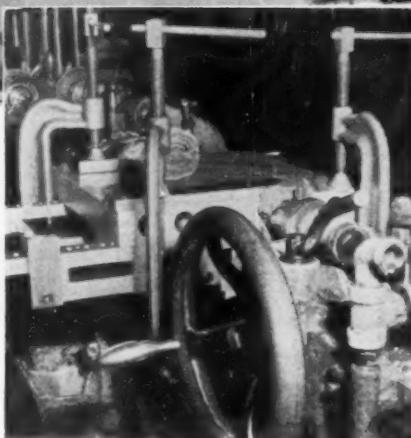
On other occasions, the deep hole drilling method has saved considerable time, effort and money. Figures for previously used drilling techniques were substantially bet-



A basic gun drill set-up in operation. Bushing (A) is smack up against workpiece. Oil flows out of flute (B) into pan. Effective despite its simplicity is fixture (C) holding workpiece. Machine can be set up (D) to handle two drilling operations simultaneously.



2. This job required eight holes of 1" diameter each to be drilled in an aluminum plate 2" thick and 14" square.



RIGHT: A rear view of a gun drill set-up for job similar to that shown above.

tered on a job requiring eight holes of 1" diameter each to be drilled in an aluminum plate 2" thick and 14" square. As per specifications, each hole was properly centered, equidistant from one another as well as from the top and bottom of the plate. (See Fig. 2.)

Hamden now takes on a highly diversified schedule. A block of

cold rolled stock 5" x 2 $\frac{1}{8}$ " was deep hole drilled with a hole 1" in diameter centered 1" from either side; another hole was drilled .686", and another $\frac{1}{4}$ ", all in the exact position specified. (See "3" of Fig. 1.) In still another case, an aluminum bar 40" long requiring a $\frac{1}{4}$ " hole was completed with a 16 micro-finish on the first pass. • • •

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But wherever you use Ottawa 60 draw dies—not just on stainless steel—this high-carbon, high-vanadium alloy comes through for you. Illustrated above are the first and second draws on transformer housings, produced from .037" gauge SAE 1010 strip. The company formerly used dies made of 5% chrome air-harden-

ing die steel—and later a more highly alloyed material—without ever getting more than about 2000 pieces before the dies began to show gall marks and pickup, and parts were rejected due to scoring, breakage and oversize. Dies made from Ottawa 60 forgings cured that! Results after 25,000 pieces showed no pickup and no wear on punch or die.

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MACHINE and TOOL BLUE BOOK



How wire thread inserts prevent

Production Fastening Bottlenecks

**Why are screw thread fasteners often overlooked
as a tool for paring basic production costs?**

By **A. H. Mussgnug**

Applications and Service Manager
Heli-Coil Corp.

• Wire thread inserts—those precision-formed screw thread liners or coils of 18-8 stainless steel wire with a diamond shaped cross-section—accommodate internal and external threads simultaneously. When screwed into tapped receiving holes, the inserts form nominal-size internal threads that eliminate seizure or galling, are stronger, and more wear resistant than unprotected threads in the same base material. Applicable to any material into which a thread can be tapped, these flexible wire thread inserts automatically adapt themselves to female receiving threads, compensate for angle and lead error between mating threads and distribute the tightening load

equally over all the engaged threads. They give 15 to 25 per cent greater loading strength than unprotected tapped threads in the same material.

The newest fastening idea available for handling a variety of production requirements is the Heli-Coil screw-lock insert illustrated above. This screw-lock has one, and in the larger sizes, two gripping coils in the middle forming a polygon instead of being perfectly round. As the screw passes through the insert the gripping coils, acting as flexible beams, are forced to assume a circular shape. The chords of the "beams" press on the screw, giving a locking action which remains effective through as many as 15 cycles and up to 100 cycles under certain conditions. Screws in screw-lock assemblies need not carry lock nuts, and may be shortened correspondingly.

How 3 firms use wire thread fasteners to

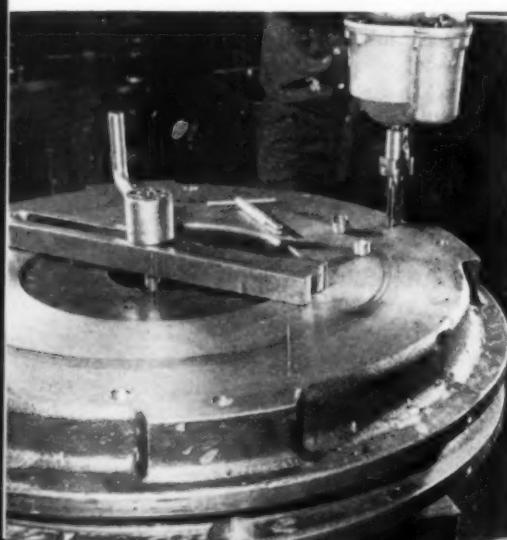
1. B. F. GOODRICH COMPANY



1. Twenty inserts protect threads which hold cast tread ring in place in tire mold.

Periodic repair of threaded holes fastening tread rings to molds had been an expensive production bottleneck in tire manufacturing at The B. F. Goodrich Company, Akron, Ohio. Ductile-iron or aluminum tread rings, used interchangeably in soft-steel tire molds for pot heater, steam dome and Bagomatic curing processes are fastened to the tire molds by 20 socket-head cap screws. During the curing cycle, heating and cooling of the tire mold and tread ring caused uneven expansion and contraction of cap screws and the parent materials. The resulting stresses caused the unprotected threads to seize and strip, making it difficult or impossible to remove and replace the cap screws when changing the tread ring. Threads were repaired by drilling out the screw, plugging and re-drilling the hole, and retapping the threads.

In order to solve this problem, twenty $\frac{1}{2}$ -13 x $\frac{3}{4}$ wire thread inserts were installed in the mold rim (Figure 1) and $\frac{1}{2}$ -13 x $\frac{3}{4}$ inserts were installed in the outside of the mold. No mold design changes were necessary to provide space for the inserts because they can be installed in bosses of the same diameter required for standard unprotected threads.



2. Installation of insert follows standard shop practice for drilling-tapping.

cut basic production costs

2. ROTOR TOOL COMPANY



3. Power tool adapted to install wire thread insert in magnesium casting.

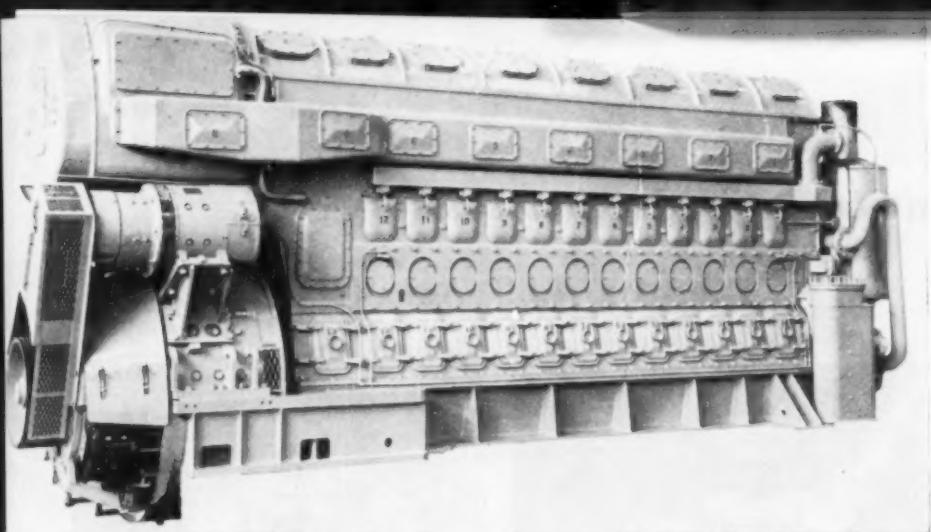


4. Oil plug hole is protected with a stainless steel wire thread insert.

Wire thread insert at first used to repair damaged threads in portable air tools by the Rotor Tool Company, are now specified in original production to prevent thread damage. Field experience indicated that the $\frac{3}{8}$ -in. threads tapped in the magnesium castings for the removable dead handle of their 13-12 and B-35 air tools were not giving 100 per cent satisfaction. These tools came back to Rotor with damaged threads from repeated re-

moval and replacement of the dead handle. The result was the specification of $\frac{3}{8}$ -18 wire thread inserts as original components for the two tapped holes which received the dead handle.

The live handle of the Rotor tool is attached on the magnesium casting with three $\frac{1}{4}$ -in. cap screws. Since maintenance of the tool required removal of the throttle handle from time to time, inserts of $\frac{1}{4}$ -20 size were specified for the three cap screw holes.



5. The 232 wire thread inserts protect aluminum threads in large casting housing of positive displacement blower cantilevered from left end (top) of the Fairbanks-Morse stationary diesel.

WIRE THREAD INSERTS continued

3. FAIRBANKS MORSE COMPANY

6. Inserts are wound into threads tapped in aluminum to receive steel machine screws of the correct size, either $\frac{1}{2}$ -in. or $\frac{3}{8}$ -in. Holes are drilled for inserts at time casting is machined. Then threads are tapped and inserts wound in.

Fairbanks-Morse has put 232 permanent, stainless-steel threads in the aluminum positive displacement blower of each model in its line of 38D stationary diesel engines and solved a weight vs strength problem. Aluminum is required for this assembly to reduce the stress on the end plate to which it is attached and reduce engine weight.

However, several air ducts, cover plates and auxiliary equipment were fixed on the blower with steel screws. Threads tapped in unprotected aluminum tended to strip and wear. In order to prevent this, wire thread inserts were installed in 232 holes on all surfaces of the blower.

The blower can be easily removed for periodic overhaul and inspection without danger of damaging the threads.



Laboratory report:

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Machinist's files—old and new, ours and others. (Of course these were hand tests.)

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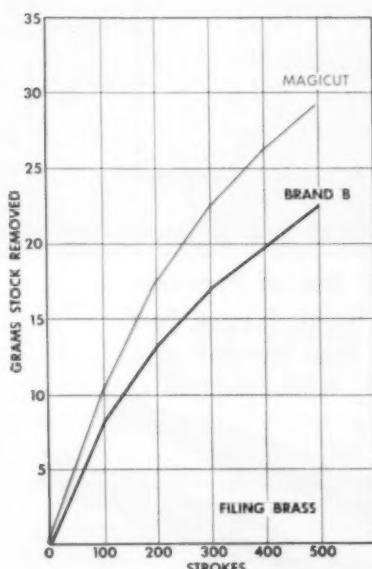
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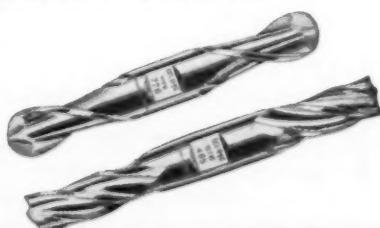


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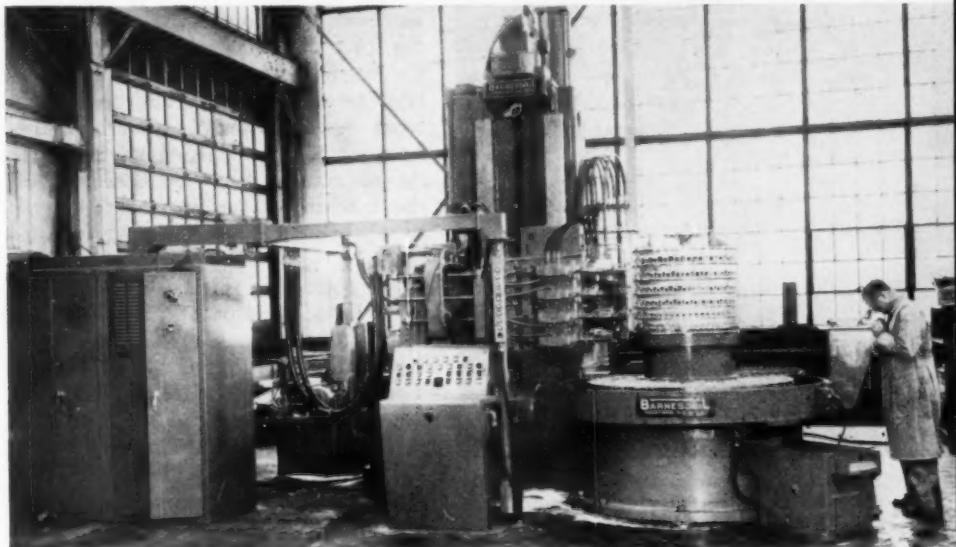
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4 Spindles Programmed to Bore 248 Holes in Casing

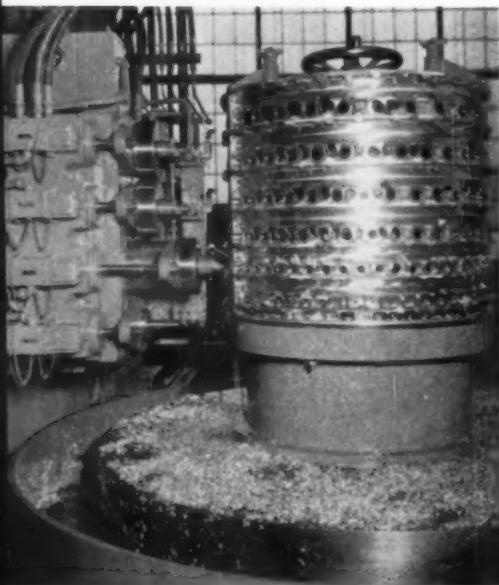
Horizontal boring machine rough- and finish-bores and generates front face and back counterbores

ROCKFORD, ILL.—A new, 4-spindle numerically-controlled boring machine, developed by Barnes Drill Co. and General Electric Co., will soon be installed at GE's jet engine plant in Evendale, Ohio. To be used in the manufacture of jet engine components, the machine

is expected to reduce setup and machining time by about 74 percent.

The machine is specifically designed to work on the periphery of cylindrically shaped parts with maximum diameters of 50 inches and maximum heights of 40 inches. This particular

continued



The 248 holes in magnesium compressor casing are generated with this tooling setup. Vertical movement of four spindles and rotary table positioning are numerically controlled.

machine is set up to put 248 holes into a compressor casing. The holes are of three different sizes and require three different operations.

However, through tape control, as many as four operations can be performed on one specific hole. The speeds are automatically changed by tape in any combination of four and the feeds and lengths are controlled by information punched in the tape.

The operations required for machining the compressor casing are finish boring and generating front face and back counterbore. The tolerance of the wall thickness between the front face

and the back counterbore has to be held. This operation requires a generating spindle and form tool.

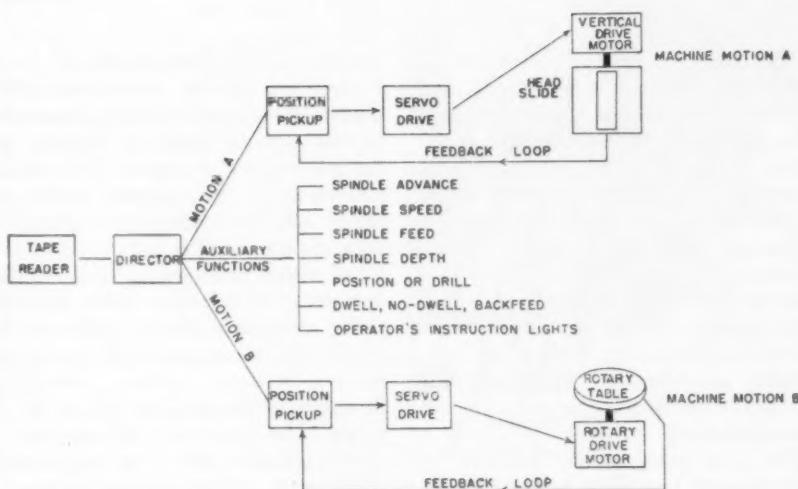
The operator locates the part in the fixture by means of an alignment telescope focused on the dividing line of the part and starts the cycle. Upon the machines completion of (248) operations of finish bore, and generating front face and back counterbore the operator removes the completed part. At no time during the operation of the machine is the operator required to change tools or to make adjustments.

All positioning of machine motions as well as operator and machine instructions are done simultaneously and from information punched in the tape. This will lend complete flexibility to the control in the event that it is used in the manufacture of different parts.

The machine is equipped with a 4 spindle heavy duty boring head mounted to a compound slide. The boring head consists of (1) precision boring spindle and (3) hydraulically actuated precision feed out quill and spindle assemblies. These are individually controlled for three different feed out ratios. Driven by a 1-hp motor, the vertical motion of the spindle is 60 inches per minute. The spindle will locate vertically over a maximum range of 40 inches.

The 55 inch rotary table is powered by a 1½-hp gear motor and will index through 360 degrees from a given reference point at a speed of approximately 5/6 RPM. The table is equipped with a lifting mechanism for rotation and a clamping arrangement for locking the table in position when the correct position is reached.

G. E. Positioning Control



Schematic of GE Numerical Positioning Control for Barnes boring machine.

Numerical information is fed from the tape reader to the director portion of the positioning control. Here the information is segregated into three main categories and delivered to their respective destinations. The numerical information for motion A is converted in the director to electrical voltages representing the desired machine slide position and fed to the position pickup unit which is mounted on the machine. The pickup unit is coupled to the machine lead screw so that as the lead screw rotates, the selsyn units inside the pickup unit also rotate. This allows the rotors of the selsyns in the pickup unit to assume a distinct angular position with respect to its stator for each .001 of an inch through-

out the total travel of the machine.

When the selsyn rotors are in the proper position with respect to the voltage applied to their stators, the voltage output of the rotor is zero. This is position error voltage. When they are *not* in the proper angular position with respect to the voltage applied to their stators (this voltage is determined from the numerical information on the tape), then the rotors produce a voltage relative to the position error which has both magnitude and polarity. It is this error voltage which is used to operate a DC motor connected to the machine which rotates in the proper direction to reduce the error below a predetermined value. When this condition is reached, you are in the proper position.

continued

The machine will maintain an accuracy of .005 inch true position and repeatability of plus or minus .001 inch. The alignment of the machine in all planes is less than .001 inch. All feed screws on the machine, (including the spindle feed out screws) are precision engineered Ball screws.

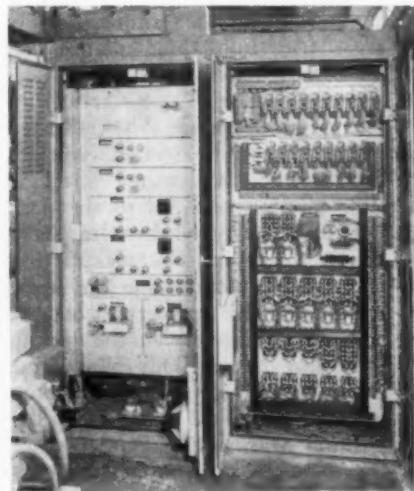
Lubrication to all points of the machine is done automatically with necessary warning signals in the event of low oil level or broken lubricating lines. Spindles are lubricated by an oil mist and the ways are lubricated through a multi-valving system.

The positioning of the machine is done through numerical positioning information punched in standard eight channel tape. Information for vertical positioning is punched in the tape in increments of .001 inch which is the

smallest bit of information to be recorded for vertical movement. Information for rotary indexing is punched in the tape in terms of degrees and decimal parts of a degree. The smallest increment is .002 degrees which converted into linear dimension on a 27- $\frac{1}{2}$ inch radius, is .001 inch.

All rotary positioning is in relation to a common reference point (zero position of table) which eliminates the possibility of accumulative error and assures accurate relative positioning throughout the entire range of 360 degrees. The necessary information is taken directly from the engineering drawing in coded decimal form.

The tape can be punched on any standard commercial controls typewriter as used for business machine equipment. The machine is complete



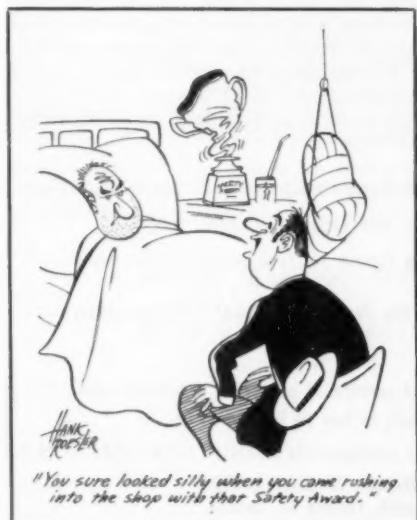
Front and rear views of machine control unit.

with a tape reader. The tape reader in the machine is a standard commercial tape reader for eight channel tape and is equipped with a magazine that stores a maximum of 100 feet of endless tape.

The control equipment on this machine was furnished in its entirety by General Electric's Specialty Control Department at Waynesboro, Virginia.

A primary advantage of this control system, according to Dr. L. T. Rader, general manager of GE's Specialty Control Department, is its capacity for selecting exact position, hole size and depth in approximately two seconds.

A secondary advantage, he said, is that responsibility for machining operations is placed in the hands of the engineer who prepares the tape. The engineer's decision on sequence of operations and dimensions to reference points gives him complete control in the production of parts. • • •



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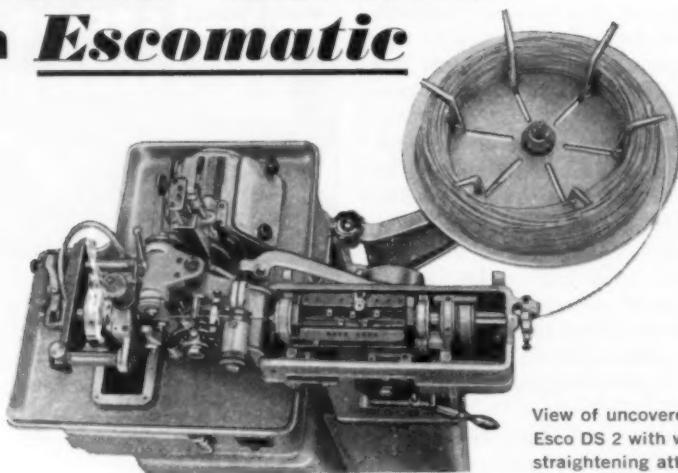
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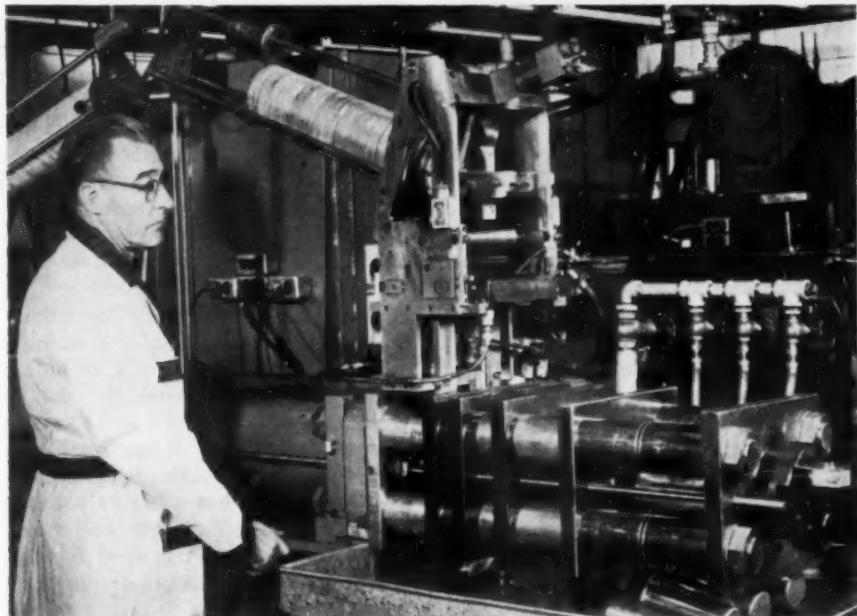
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Press forms the can bodies by drawing discs of aluminum sheet through cupping, ironing and bottoming dies automatically in a single stroke of the punch. Press may be operated simultaneously from both ends. Discs are fed into the press from above.

New Drawing Technique for Producing Aluminum Cans

• A new drawing technique for the commercial production of seamless aluminum cans has been developed by Kaiser Aluminum & Chemical Corporation. The company has installed a commercial prototype can-making fa-

bility at its container plant in Wana-
tah, Indiana, and is starting produc-
tion of an initial order of 5,500,000
cans for the Kraft Foods Division of
National Dairy Products Corporation.
Under conventional drawing meth-

Field Reports

continued

Seamless can bodies with depth up to 3 times their diameter

ods, it usually is not possible to perform a greater draw than 50 per cent of the diameter in one stroke. Thus several forming operations are required to bring the can body to its desired shape and size.

With the Kaiser Aluminum method, however, the can body may be formed in a single operation. In fact it is now possible, according to General Manager D. A. Rhoades, to produce seamless can bodies with a depth of up to three times their diameter in a single stroke. This technique also makes possible the production of rigid durable

cans with walls as thin as five-thousandths (.005) of an inch.

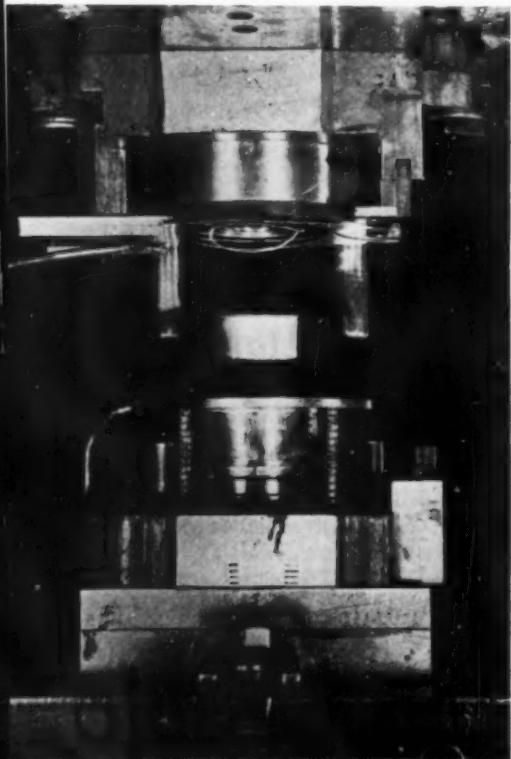
With the new process it is easy to vary the size and shape of deep drawn cans for production on the same equipment. The new can-making unit also requires only a small fraction of the floor space required by conventional can manufacturing equipment.

Mr. Rhoades cited several other advantages for the new deep draw process.

"From the standpoint of protection," he said, "the fabrication of a seamless can body from a single disc of aluminum virtually eliminates the danger of leakage. Aluminum's non-sparking characteristic makes it an ideal container for inflammable materials.

"The can also has a highly polished surface as it comes off the press, thereby eliminating the need for further finishing. It requires a minimum of cleaning, is completely rustproof and can be decorated easily."

He also pointed out that because of aluminum's high ductility, the metal can be worked into many new designs



A completed can body is ejected from a "one-time" shallow draw and trim die mounted in a single-action vertical press. Aluminum sheet from a coil is fed continuously into the machine which forms, flanges and trims a shallow can body in one stroke. The die, patent rights for which are held by Kaiser Aluminum & Chemical Corporation, is the only type known to be capable of performing these three operations at once.

can be made in a single stroke

and shapes, another merchandising plus.

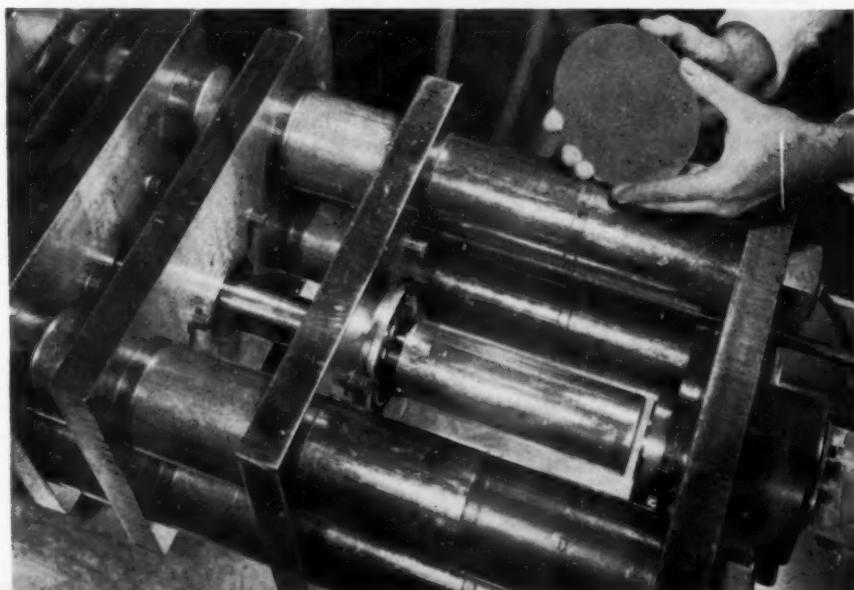
In addition to the deep draw process, Kaiser Aluminum is perfecting other methods of producing aluminum containers. Some of these, according to Mr. Rhoades, look "very promising."

"For example, the cans we made for the Air Force were produced by a method we have developed for making cans from coil stock in which one die blanks, forms, trims, sizes and flanges in a single operation," he explained. "Although these are shallow cans, with a depth less than their diameter, they have excellent possibilities for many packaging uses." • • •

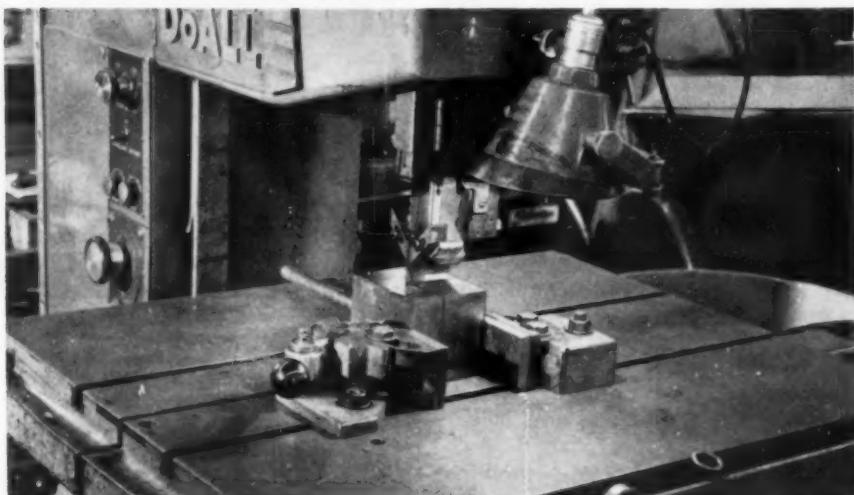


The set of dies and punch held in two hands illustrates the simple tooling requirements of the new drawing technique to produce seamless one-piece aluminum can bodies and bottoms, as compared with the elaborate series of dies and punches on the table required for conventional drawing operations to obtain identical end results.

Final stage of the continuous drawing operation. A disc of aluminum sheet, like the one held above, has been forced through a series of dies by a punch. As the punch returns to its original position, the can will drop to a conveyor belt leading to a trimming and flanging machine.



continued



Titanium bar section, just cut off on the power saw, is being cut into smaller sizes and shapes on the DoAll model 16-3 band machine at Mallory-Sharon.

Band Machining Titanium Test Specimens

NILES, OHIO—Mallory-Sharon Titanium Corp. supplies titanium to such companies as North American Aviation Co., E. I. duPont deNemours and Co., Thompson Products Corporation, and Eaton Manufacturing Company.

Titanium's lightness (it weighs 44% less than steel), its great strength and corrosion resistance make it an ideal material for many applications in addition to the already well known air frame and jet engine uses. Typical of these new uses for titanium is a 250 gallon food kettle which is now being evaluated for the preparation of cor-

rosive foods such as pickles and tomatoes.

In supplying such diversified needs, Mallory-Sharon compresses titanium sponge into electrodes which are converted into ingot form by consumable-electrode, arc double melting. These ingots are then fabricated into basic mill shapes such as rods, bars, sheets, billets, plates and wire. The company also combines titanium sponge with aluminum, manganese, chromium, vanadium and other elements to make various titanium alloys.

To insure the quality of titanium

processed at its plant, Mallory-Sharon subjects samples of each titanium lot to rigorous laboratory tests.

The company had formerly employed an abrasive cut-off machine and a cold saw to cut sample pieces of titanium to size for testing. However, these cutting methods did not permit enough flexibility nor speed of cutting the various titanium alloy combinations. In addition, the company recognized the need for a machine that would cleanly cut the pieces with the least possible amount of material loss.

After investigating various cut-off methods, the company installed a power saw to cut the titanium bars and billets into preliminary sizes. This proved highly successful, cutting two to four times as fast as the previous method, with one-fifth the tool cost and with half the material loss.

Today Mallory-Sharon has a workable three-way team of DoAll power and band saws. Two model 16-3 band machines perform the intricate cutting of the bars or billets in segments, which range in size from $\frac{1}{2}$ -inch to three inches in thickness and from four to 13 inches in diameter.

The cleanliness of the cut in these billets is important to the laboratory because they use those pieces to test the titanium lot for tensile strength, elongation and bending properties. The billets also undergo other mechanical property tests and chemical analysis to establish conformity to material specifications.

• • •

Tilt Type Gages Used 30,000 Times

BENTON HARBOR, MICH.—How long do plug gages last in industry be-

fore wearing out? Ed Clough, superintendent of Gast Mfg. Co., was curious to find out. The operation he surveyed was the checking of the I.D. finish grind size of cast iron pump parts where the diameter is slightly under $3\frac{3}{4}$ " and total tolerance is .002".

Gages used on this operation are of the tilt type—DuBo plug gages—and were purchased 10 years ago. Mr. Clough estimates these gages have been used 30,000 times, and can be used for 30,000 more such gaging operations. He maintained that the lightweight and ease of entry of the gages reduced checking time, and no allowance for checking is needed in the grinding rate.

The DuBo plug gages surveyed are a product of Standard Gage Co., Inc., Poughkeepsie, N.Y.

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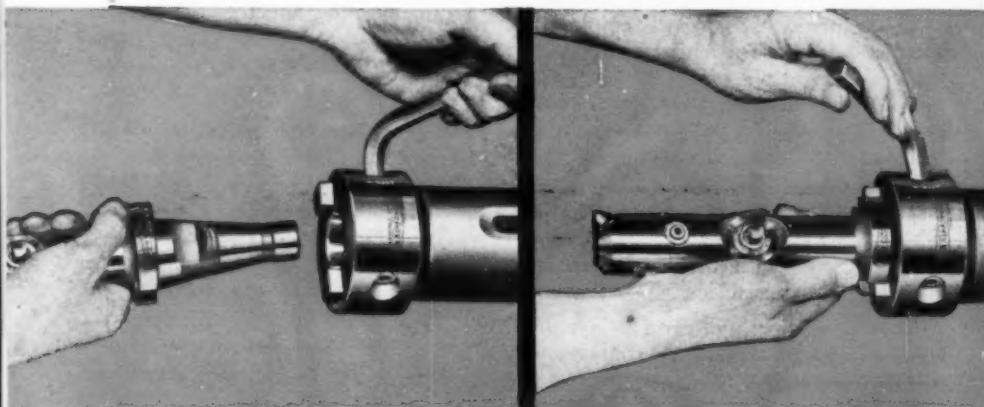
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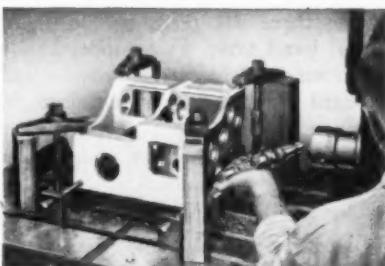
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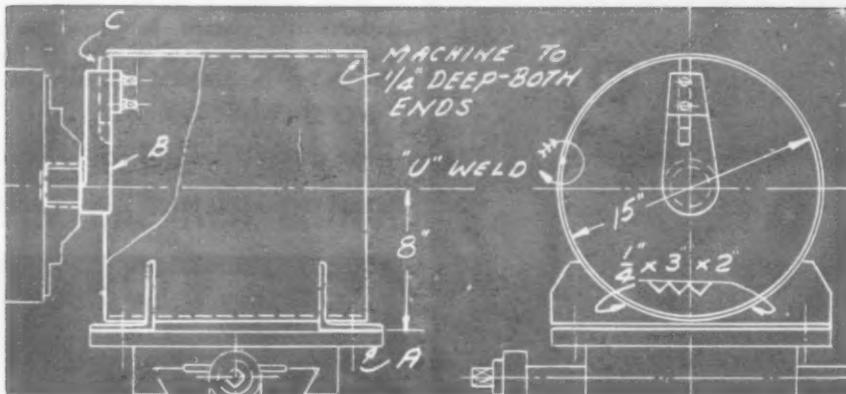
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1. Generator drum and tooling in lathe set-up.

Lathe Tooling Set-up for Boring Generator Frames

By Alex Armott

- The generator frame outlined in figure (1) is of welded construction, the body is rolled from light weight plate and "U" welded. Two standard structural angles welded to it form the base.

Distortion of the circular body caused by too much welding heat necessitated an internal machining operation to true up both ends to fit the generator end plates at assembly. A boring mill was not available and as an alternative a lathe set up was made.

A fixture (A) with holes to match

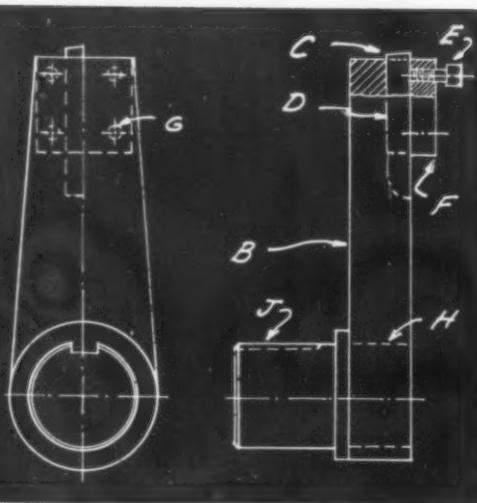
the generator hold down bolt centers holds the frame in position and it is fitted to the cross slide with ways.

Tool holder (B) is detailed in figure (2) and it consists of a standard tool bit (C) held in a milled slot cut in the bar (D) and clamped in correct height position from the center line of the chuck to the outside edge of the tool tip by two square head screws (E). These are tapped through the plate (F) held to it with four screws (G).

The spigot (H) is turned a press fit for the bar and the diameter (J) is held in the chuck, the keyway is

Shop Hints

continued



2. Tool holder.

cut to accommodate a standard key for driving purposes.

The generator frame is held stationary on the fixture as the tool holder is slowly rotated around the inside of the frame to make the cut approximately $\frac{1}{4}$ " from the end of the frame.

• • •

Locking and Separating Device for Handling Finished Cups

• A simple locking and separating device is being successfully used by The Timken Roller Bearing Company in the handling of its large finished cups. Designed by K. R. Adair, Superintendent of Maintenance, and built by the Timken Company's Sheet Metal Department, the device makes it pos-

sible to stack one large cone on top of another without the danger of their slipping. A sudden stop or quick turn without the clamps in place could cause the heavy cones to slip off the skid due to the smooth surfaces of the front and back faces.

The space created between the large pieces by the devices makes it possible to quickly attach power crane hooks



for lifting and permits freer slushing action during the washing operation. Avoided too is the possible rusting of cups from washing solution residue being trapped between the faces of the cups when resting one on the other. All contact between the work piece and the device are merely line contact points. Rust spots make it necessary to re-finish the surface of the cup.

Brass shoes on the locking device prevent nicking or scratching of the piece.

• • •

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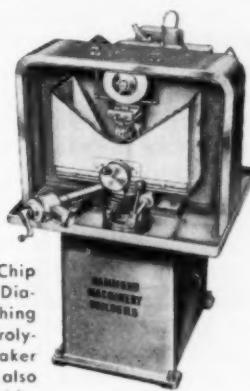
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January, 1958

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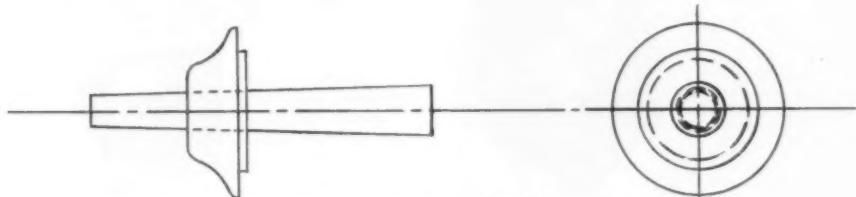
Self-Locking Mandrel for Turning and Facing Hubs

By James Royalty

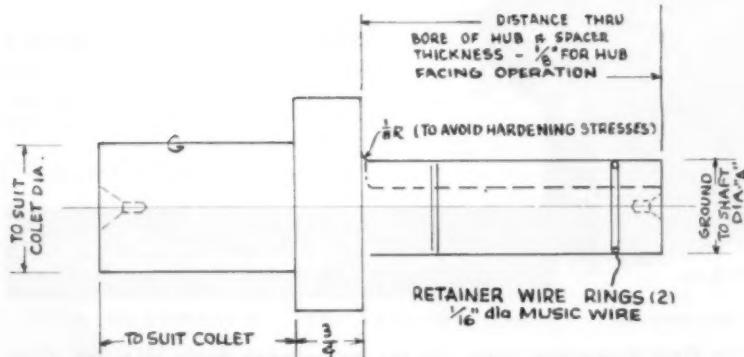
• A number of our products require machined parts. Since we are primarily a job shop company these parts are produced in relatively small lots and do not justify specialized machinery.

One of these parts is a cast iron hub used on our exhausters and centrifugal dust collectors and made in 10 sizes ranging from two pounds to 70 pounds. After boring the proper diameter hole

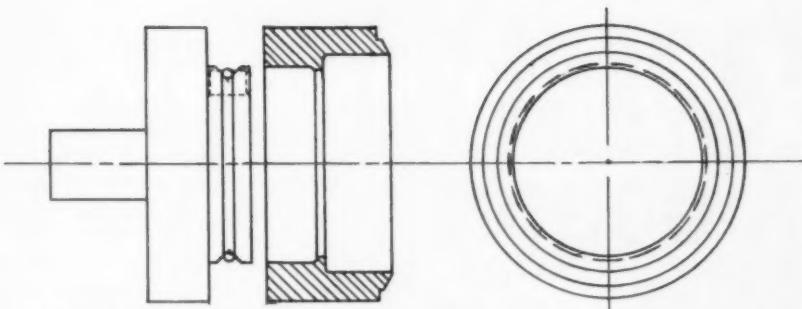
for the shaft, it is necessary to face the front of the hub for the hub cap. This was originally done by inserting a tapered mandrel through the hub and secured by pressing the hub tightly on the mandrel in an arbor press. The hub was then placed in the lathe and centered. The lathe was set to the proper speed and fed automatically until the cutting tool came into close proximity with the mandrel. It was then necessary to hand feed the cutting



1. Old way: tapered mandrel inserted through cast iron hub.



2. Self-locking mandrel. It can be set up in either collet or chuck.



3. Bearing pad held in self-locking mandrel.

tool to complete the facing operation and great care was required not to bring the cutting tool in contact with the mandrel. (See figure 1.)

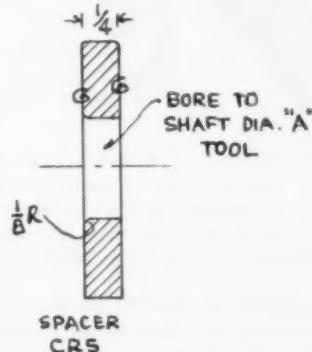
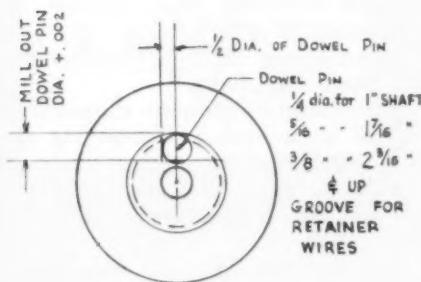
Upon completion of the facing operation, the hub was removed from the mandrel on the arbor press and the cycle repeated.

Even with extreme care, the mandrel was damaged and it was necessary to replace or rework the mandrel periodically. Both a hardened and soft mandrel have been used. If the cutting tool would strike the hardened mandrel, it would become dull or even chip. If a soft mandrel was used, the cutting tool would damage the mandrel. In

either case there was a tool expense.

The mandrel, illustrated in Figure 2 has replaced the tapered mandrel. This mandrel can be set up either in a collet or chuck depending on the size of the work piece and the only additional set up time is to replace the finished piece.

This mandrel is self locking. The hub is placed on the mandrel, the mandrel being made so that the hub will overlap $\frac{1}{8}$ " after the facing operation. By turning the hub clockwise, it will tighten on the dowel pin, locking it. The piece is then ready for the facing operation. Since the lathe rotates in a counterclockwise direction, pressure is

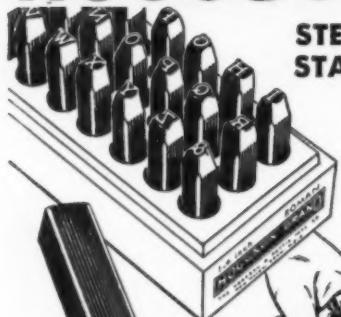




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maintained on the work piece so that it cannot possibly unlock. The lathe can then be fed automatically through the whole facing operation without fear of damaging the cutting tool or the mandrel.

To unlock the piece it is necessary to exert only a slight pressure in a counterclockwise direction.

The mandrel is made with a radius on the locating end to avoid hardening stresses. The spacer is used to cover the radius and allow the work piece to be inserted tightly against the mandrel collar.

The hub casting is only one of a number of applications on which this type mandrel can be used. Figure 3 shows a bearing pad which was originally chucked individually in a 3-jaw chuck. Each bearing pad required approximately one minute to set up for the machining operation. By using the mandrel shown in figure 3, the set up time per bearing pad has been reduced to six seconds. The basic idea can be modified for a multitude of jobs.

Conclusion: The following advantages are derived as a result of this improvement.

1. An average of 80% reduction in set-up time.
2. An average of 15% reduction in machining time.
3. Practically a complete elimination of replacement and reworking of mandrels.
4. More productivity per machine and consequently less machines required.

I believe that the above advantages far outweigh the direct labor savings of \$750.00 per year.

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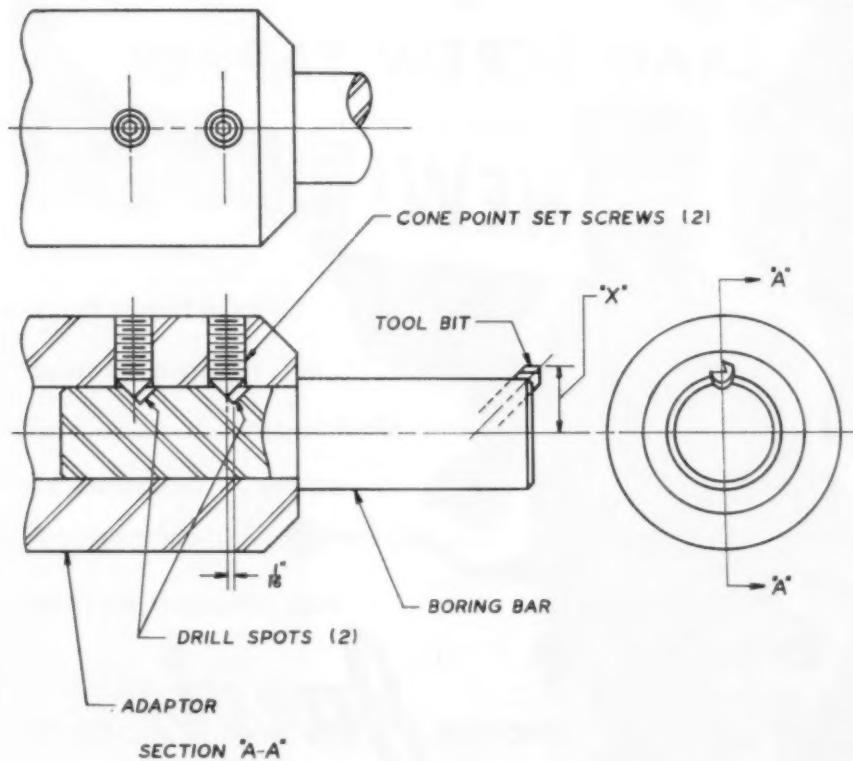
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Boring Bar Design

By Cliff Bossman

- Many boring bars are held in position by set-screws which tighten against a milled flat on the tenon of the boring bar.

This approach is satisfactory in some cases but when it is imperative to hold the boring bar tightly against its shoulder or surface "A," this method is not ideal.

A very satisfactory solution is illustrated in the sketch. Drill spots are used instead of a mill flat; the cone point set-screws are located $\frac{1}{16}$ " off-center as shown. This off-center condition forces the boring bar back against shoulder "A"; in addition, it prevents the boring bar from turning radially in the adaptor.

This wedging effect may be used for many similar applications. • • •



Figure 1

Elastic Stop for Coining Dies

By Federico Strasser

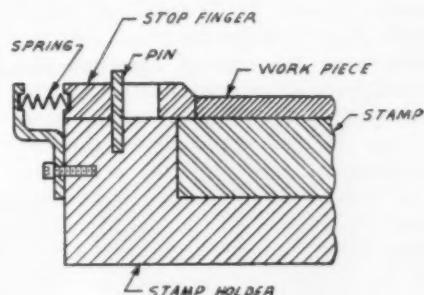
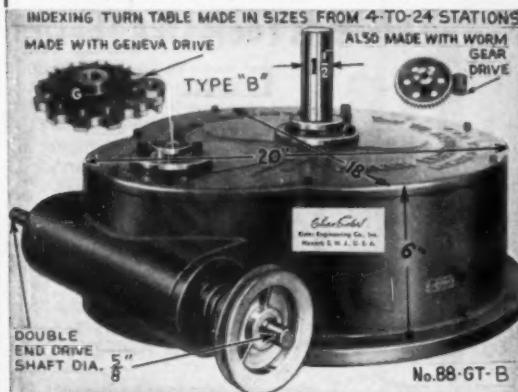


Figure 2

- When coining comparatively large and thin components, where great plastic deformations take place, I had

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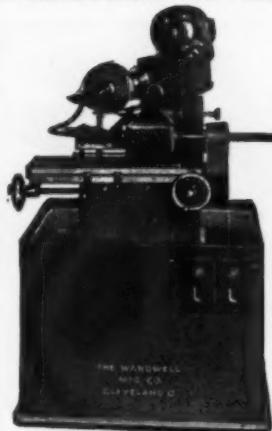
serious trouble with the stops. In fact, if I made them—as customary—in the form of nests with openings made with close fit to the flat blank contour, then after the coining operation the workpieces (expanded heavily by the stamping process) stuck to the nest. It was difficult to remove the finished components. If I made the nest opening with sufficiently large clearance, so that the removal of the coined stampings should be easy, then the location of the original blanks before the coining operation was incorrect, due to the great differences in size.

I solved this problem by substituting the nest with a series of elastic stop pins (Fig. 1). These are made like reversed

starting stops, as used for progressive type dies (Fig. 2). They are simple, small rectangular steel blocks, properly guided and pushed inwards by small compression springs; a stop pin limits the inward travel so that in the rest position, the point of the stop should coincide exactly with the blank outline. An oblong hole and the compression spring allows for radial movement, if and when necessary.

A sufficient quantity of such stops (at least three for round workpieces and six for rectangular shapes) locates the blanks with perfect accuracy, yet takes care—by its elasticity—of the expansion of the workpieces provoked by the heavy plastic flow of metal. • • •

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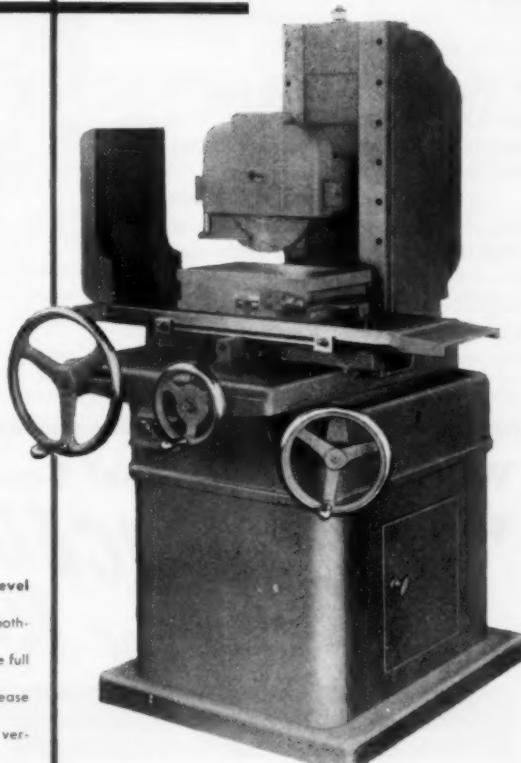
Set-up time and operator effort are reduced while accuracy is increased by the advanced Covel design features incorporated in this new surface grinder. You can handle die block and general tool room work with remarkable efficiency and speed with the new Covel No. 17 which gives large capacity at low cost.

Note these advanced Covel features:

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- **Hardened and ground lead screws** on vertical and transverse feeds.

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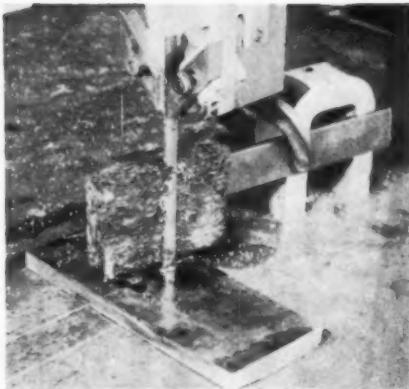
continued

Lubrication Wiper For Metal Cutting Band Saw

By H. J. Gerber

- The illustrated arrangement can be quickly improvised to wipe a steady supply of cutting oil onto a metal cutting band saw blade.

A small cellulose sponge was attached to a flat piece of steel bar with rubber cement. The steel flat is then clamped to a strong permanent magnet. The magnet may then be seated at any convenient position on the saw table. Cutting oil is applied periodically to the



sponge from a squirt can and will wipe off steadily on the blade as the job progresses. Lubrication will be found to be particularly effective when cutting aluminum and other soft metal alloys.

• • •

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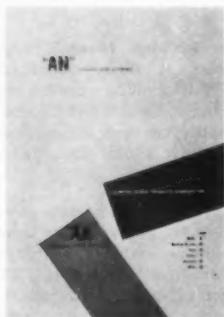
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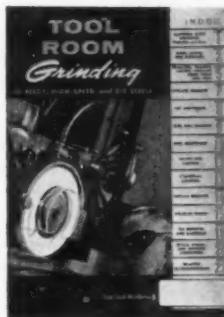
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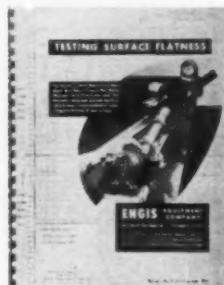
MACHINE AND TOOL
blue book



(See Number 1)



(See Number 2)



(See Number 3)

1. Catalog of stainless steel "AN" fasteners describes government specification aircraft bolts, slotted and Phillips machine screws, flat and round rivets, and washers. Illustrations, stock sizes, dimensions are included for each item. Allmetal Screw Products Co.

2. "Tool Room Grinding of Alloy, High-Speed, and Die Steels," is designed to be a single source book on grinding for tool room men. It covers 22 areas in the field with concise, factual copy, illustrative pictures and clarifying charts. Carborundum Co., P.O. Box 477, Niagara Falls, N.Y.

3. "Testing Surface Flatness" presents a simple, accurate and fast method of surface checking with the Auto-Collimator, a technique that anyone can use on any type of surface plate. Engis Equipment Co., 431 S. Dearborn St., Chicago.

4. Coolant, Lubricating Compound. Lubri-Cut is said to have excellent lubricating qualities, high thermal conductivity. It is applied in small amounts to work or cutting tools, by tube, stick, or brush. For blind- or thru-hole tapping, drilling, reaming, saws. Folder from LC Tap & Drill E-Z Corp., Div. of Darco Industries, Inc., 2151 E. Rosecrans Ave., El Segundo, Calif.

5. Throw-Away Inserts. Triangular and square inserts for negative rake toolholders, made of new high purity ceramic material, are presented in Bulletin No. 5710. Speeds of 2000 sfpm and up; feed to .020"; cuts up to $\frac{3}{8}$ " depth. Vascoloy-Ramet Corp., Waukegan, Ill.

6. Brake and Clutch Linings. Folder describes industrial applications for Red Block brake sets. Typical applications are large forming presses, cranes, oil well rigs, road building and construction equipment. No-fade guarantee (heat or water). World Bestos, New Castle, Ind.

7. Cutters and Accessories. New 96-page illustrated Catalog No. 37C covers company's entire line of metal cutting tools, as well as arbors, adapters, collets, vises, index plates, work driving dogs, taper mandrels, expansion bushings, and spring chucks. Over 200 new items. Brown & Sharpe Mfg. Co., Providence, R.I.

To receive copies of literature described on these pages, simply encircle corresponding numbers on handy postage-free Action Cards opposite page 64 and elsewhere in this issue.

Free Literature

continued

8. Indexing Trunnions. Catalog includes illustrations showing the speed and convenience of the company's product in drilling, tapping, and counterboring of a typical machine housing. Complete specs are listed on all trunnion models, as well as on adaptors. Johnson & Bassett, Inc., 110 Foster St., Worcester, Mass. (Bulletin No. 1057)

9. Ways and Gibs, composite die sections, heel and guide blocks, die wear plates, clad bronze wear plates, clad bronze ways, Bronzoil are described in booklet being distributed by the Ohio Knife Co., Cincinnati, Ohio.

10. Radial Drilling Machine. Sensitive ram adjustment on the Johansson radial drilling machine makes it quick and easy to spot drill accurately over each hole location. Presented in folder from I. O. Johansson Co., Skokie, Ill.

11. Die Sets. All-steel sets designed to parallel the punch and die classifications established by the ASTE punch and die committee are shown in 63-page catalog, No. 570. Standard Die Set Co., 1489 Elmwood Ave., Providence 7, R.I.

12. Hydraulic Presses. Bulletin 6.17 is a 16-page bulletin which describes the function and illustrates applications, giving general press specifications, of four-

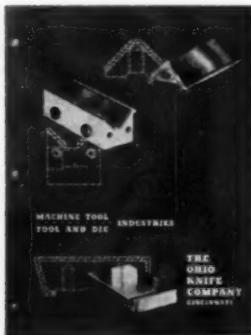
column, single action hydraulic presses in the various types of metalworking: high tonnage drawing and forming, die quench forming, stretch forming, rubber pad forming, deep drawing, steel forging, aluminum forging, etc. Lake Erie Machinery Corp., 1002 Woodward Ave., Buffalo.

13. "Dial Indicator Service Manual and Parts List" is aimed at those users of Standard dial indicators who prefer to do their own servicing. Included are exploded views to enable correct identification of parts. Standard Gage Co., Inc., Poughkeepsie, N.Y.

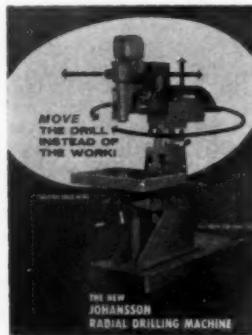
14. Lathes. These types of lathes are presented in Bulletin C-57: heavy duty engine; Regal; dual drive; standard duty; sliding bed gap; hollow spindle; RT toolroom; rapid production; crankshaft. Hydra-Trace duplicating attachment and LeBlond-Carlstedt Rapid Borer are also described. R. K. LeBlond Machine Tool Co., Madison & Edwards Rds., Cincinnati 8, Ohio.

15. "Traps to Avoid in Small Business Management" points out that more small businesses become the unsuspecting victims of perilous management traps than do larger businesses, and gives examples of bankruptcy in small manufacturing firms. Small Business Administration, Lafayette Bldg., Washington, D.C.

16. "Kenplate Tungsten Carbide Surfacing" describes a new product introduced by Kennametal Inc., Latrobe, Pa. Ken-



(See Number 9)



(See Number 10)



(See Number 12)

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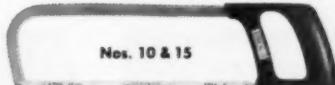


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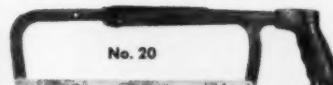


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plate consists of small hexagonal carbide buttons assembled on a flexible backing material for bonding on metal surfaces. Protects metal parts against abrasion and wear.

17. Precision Tools. Seven new R and L tools and attachments make their first appearance on the pages of 32-page catalog: on-and-off center drilling attachment; tool holder, cross slide knurling tool, tool slide knurling tool for multi-spindle automatics; combination swing tool; swing tool attachment and knurling attachment for turning tool.

18. "Basic Facts on Unitized Tooling" graphically illustrates and describes the fundamental principals of this type of tooling. Included are tooling cost comparisons, typical setups and mounting methods for presses and press brakes, typical notched and performed angles. Punch Products Corp., Niagara Falls, N.Y.

19. Carbide Technical Manual tells of the manufacture and physical properties of tungsten carbide, Firthite grade selection and application, the use of single point tools, recommended cutting speeds. Information is given graphically wherever practical. Pictures and drawings are included throughout. Firth Sterling Inc., 3113 Forbes St., Pittsburgh 30, Pa.

20. Spindles. Pamphlet illustrating precision grinding and boring spindles shows

many practical applications. Manufacturer claims first line of standard spindles for precision boring operations. Ex-Cell-O Corp., 1200 Oakman Blvd., Detroit.

21. Horizontal Boring Machine, for precise boring, drilling, milling, and tapping, is presented on pages of folder from the Lucas Machine Div., New Britain Machine Co., Cleveland 8, Ohio. Any or a combination of these operations is possible on either small tool and die work or for heavy duty performance.

22. Design Scholarship. James F. Lincoln Arc Welding Foundation's annual mechanical and structural design competition offers 46 cash awards to undergraduates. Rules are available from the Foundation, Cleveland 17, Ohio.

23. Hold-Down Vise for surface grinding and milling is said to eliminate parallels, hammering, buckling, checking. Other advantages claimed: holds tolerances; accurate seating; one hand operation; grips work tighter. Booklet from Illinois Metal Products, 429-31 W. Superior St., Chicago 10, Ill.

24. Drill & Tap Machine. Burgmaster bench model, six spindle, auto-indexing turret machine is claimed to cut costs, save space, increase production. Sensitive 3/16" capacity. Flyer from Burgmaster Corp., Gardena, Calif.

25. Films on Press Use. A new 4-page booklet describes four 16mm sound and color movies covering these subjects: (1) inclinable press maintenance; (2) high production press maintenance; (3) 100th



(See Number 17)



(See Number 18)



(See Number 20)



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Bliss transfer feed press; (4) transfer feed presses in appliance industry. E. W. Bliss Co., Canton, Ohio.

26. Barrel Finishing. Catalog sheet describes Handee Slide-Abrader, Model A1-56. Deburring, radiiing, and finishing of small parts for screw machine, machine shop, die cast, and stamping departments. Chicago Wheel & Mfg. Co., Chicago, Ill.

27. "What Do You Mean, 'Specific' Taps?" tells how to get longer tap life and better performance when tapping different materials, such as tough steels, cast iron, aluminum, zinc, brass, and plastics. Detroit Tap & Tool Co., Warren, Mich.

28. Drilling Machine. A production type table with lifting mechanism and multiple head floor type bases have been added to line of precision tool room drill presses. These machines provide a moderately priced drill press for precision work in tool rooms, model shops, laboratories and production. Bulletin from Electro-Mechano Co., Milwaukee, Wis.

29. Preventive Maintenance Chart is divided into three parts: cleanliness, lubrication, and inspection & adjustments. Under each heading is a column for the item on the machine requiring attention, a column describing the servicing required, and a column giving the fre-

quency with which service should be performed. Gisholt Machine Co., Madison 10, Wis.

30. OBI Mechanical Gap Presses. Complete facts on new line of Oliver-Farquhar presses are contained in Bulletin M-100. Capacity: 75, 100, 150, and 200 tons. A. B. Farquhar Div., Oliver Corp., 128 N. Duke St., York, Pa.

31. "Facts about Air Reduction" is a revised edition of a company publication. Tells the story of Air Reduction and its many activities and interests in a simple concise manner. Air Reduction Co., Inc., 150 E. 42nd St., New York.

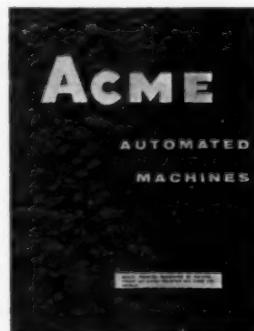
32. Automated Deburring Machines. Bulletin presents line of standard and special machinery for the deburring of production parts. Machines range from semi-automatic types for low and medium production rates to fully automated installations for high production requirements. Acme Mfg. Co., 1400 E. 9 Mile Rd., Detroit.

33. High Speed Drilling Machines. Ball bearing, motor driven, sensitive drills, No. 4BM and No. 5BM are presented in booklet from the Fosdick Machine Tool Co., Cincinnati, Ohio. Built in combinations of one to six spindles. Six and nine spindle speeds, standard range, with 1800 rpm. motor.

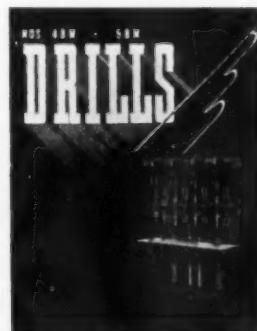
34. Power Presses, Arbor Presses, air presses, drill presses, foot presses, band saws, squaring shears are described and pictured in booklet from the Famco Machine Co., Kenosha, Wis.



(See Number 28)



(See Number 32)



(See Number 33)

Free Literature

continued

35. Countersinks. Bulletin 702, on HSS and carbide Uniflute countersinks, includes specifications and prices and a description of a method to resharpen the tools in your own shop. It may be obtained from M. A. Ford Co., Davenport, Ia.

36. Precision Gears. speed reducers, and motorized reducers are presented in Booklet PG-100. Outlines ranges, sizes, and types of gears available. It also illustrates actual production steps used in the manufacturing process, from the arrival of new materials to the finished gears. Grant Gear Wks., Inc., Boston.

37. Milling Machine. The Master-Mill, for general manufacturing, tool and die work, or miscellaneous milling operations, has a forged, heat-treated alloy steel spindle of generous proportions mounted on three bearings which are supported in solid metal integral with the main column. Machine is presented in Bulletin No. 151-C, Kempsmith Machine Co., Milwaukee, Wis.

38. Tube Piercing. Folder describes Koppy Tube-Pierce machine, which pierces up to 600 round or irregular-shaped holes per hour. Automatic release of tube from mandrel permits ease and speed of loading and unloading. Koppy Tool & Die Co., 1530 Farrow Ave., Ferndale 20, Mich.

39. Industrial Furnaces, ovens, kilns are

catalogued in brochure. Copy is augmented by photographs, diagrams, specification tables. L & L Mfg. Co., 136 Eighth St., Upland, Delaware County, Pa.

40. Grinding Machines. New 16-page catalog describes 14" and 18" swing plain cylindrical grinding machines, designed to carry workpieces up to 6500 lb. Supplied in center lengths from 48" to 168". Landis Tool Co., Waynesboro, Pa.

41. Angle Plate. Well-illustrated brochure shows the features of the Lassy Master V-block angle plate. Two stock models, matched pairs, and sine bar. Lassy Tool Co., Plainville, Conn.

42. Jig Boring Machine. Flexibility simplicity, versatility, plus tool-room precision are claimed for improved Linley machine. Folder from Linley Bros. Co., Bridgeport 1, Conn.

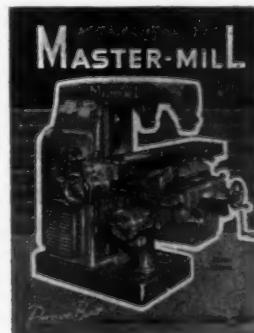
43. OBI Presses. Perforated booklet gives the facts about Series 1 OBI presses, Nos. 1 to 6. Capacity 12 tons to 60 tons. Minster Machine Co., Minster, Ohio.

44. Cutting-off Machines, automatic loaders, hot spinning machines, safety drill tables are presented in booklet from Modern Machine Tool Co., Jackson, Mich.

45. Tool Steel. Marshall OILCrat (SAE-O1) is a fine grained, electric furnace tool steel. It is furnished spherodized annealed as standard, ground to a smooth finish free of decarburization. AIRCrat (SAE-A2) and MarshallCrat (low carbon) are also described in folder from Marshall Steel Co., Box 108, La Grange, Ill.



(See Number 36)



(See Number 37)



(See Number 43)

CLEARING SERIES-S PRESS SOLVES A TOUGH ONE AT TAIT

Heavy tonnage high up on the stroke—that's what Tait Mfg. Co. in Dayton, Ohio needed to draw stainless steel pressure vessels. The solution was this 250 ton double crank press with a 500 ton drive. Accurate, dependable operation without troublesome maintenance. That's typical of the Clearing Series-S press. Want details and catalog? Just write.



CLEARING PRESSES



the way to efficient mass production

CLEARING MACHINE CORPORATION—division of **U.S. INDUSTRIES, INC.** 617
6499 W. 65th Street • Chicago 38, Illinois / Hamilton Plant • Hamilton, Ohio

Use postpaid card. Circle No. 312

46. Templates. Standard templates to save layout time are pictured in folder from Northwestern Tool & Engineering Co., 117 Hollier Ave., Dayton 3, Ohio. Jig feet, quarter turn screws, flanged nuts, knobs, fixture keys, knurled head screws, shoulder screws, latch bolts are shown.

47. Grinding Wheel Calculator. Selection of the correct abrasive wheel for grinding 17 commonly used metals is facilitated with use of this pocket-size calculator. It indicates type of abrasive, grit size, grade,

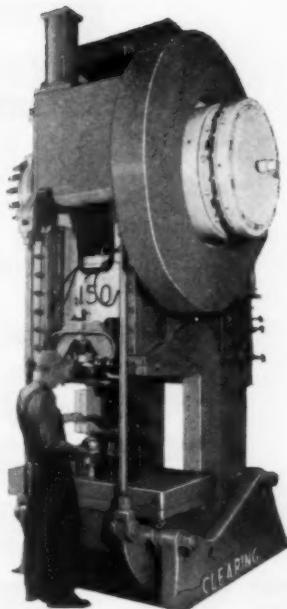
and bond for both straight-type wheels in sizes $10 \times \frac{1}{2}$, $12 \times \frac{1}{2}$ and 1×3 in. and for cup wheel sizes 6×3 in. with $\frac{3}{4}$ in. rim. Price \$1. Abrasive Machine Tool Co., Dept. ND, East Providence, R.I.

48. Band Saw. The Peerless high speed production band saw provides for sawing billets, heavy bars, pipe and structural shapes. Claimed to "think for itself," compensating feed unit automatically regulates blade pressure at all times. Peerless Machine Co., Racine, Wis.

CLEARING O.B.I.'S RELIABLE?

**ASK RELIABLE
MANUFACTURING CO.**

When the backbone of your production depends on O.B.I.'s, you want machines that you can rely on. That's why Reliable Mfg. Co. in Chicago, Ill. chooses Clearing's. As a contract stamping shop they need dependability and efficiency. Their O.B.I.'s range from 75 tons to the 150 ton machine shown here. "Reliable", says Reliable, "That's Clearing."



CLEARING PRESSES



the way to efficient mass production

CLEARING MACHINE CORPORATION—division of U.S. INDUSTRIES, INC.

6499 W. 65th Street • Chicago 38, Illinois / Hamilton Plant • Hamilton, Ohio

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49. Coil Cradles, straightening machines, and accessories for handling coil stocks are presented in Catalog 16. Rowe Machinery & Mfg. Co., 1506 N. Industrial Blvd., Dallas, Texas. Book is well illustrated.

50. "A Preview of the Leisure Years," published by Retirement Education, Inc., Caxton Bldg., Cleveland, Ohio, helpfully explores such subjects as general attitudes toward retirement, the importance of developing potentially useful activities, financial planning for the future, Social

Security, the protection of health, where to live in retirement, travel.

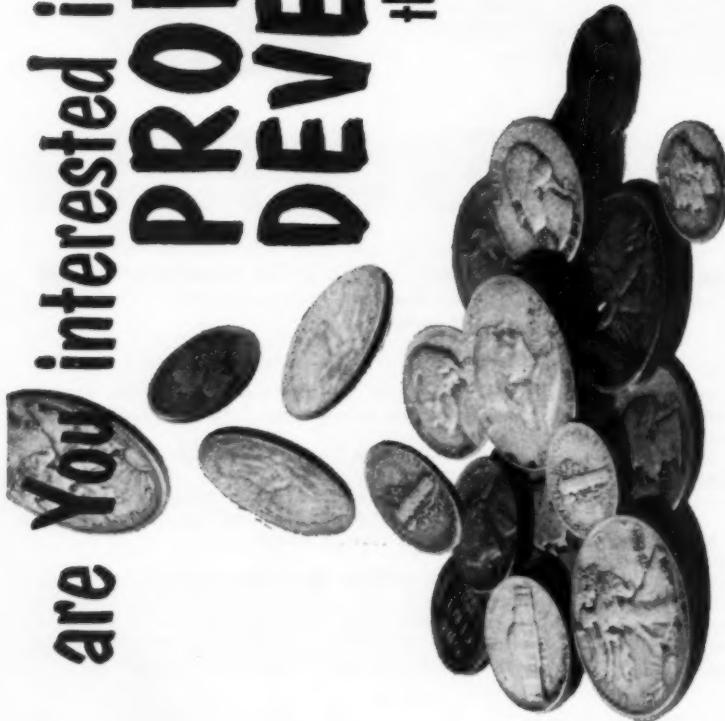
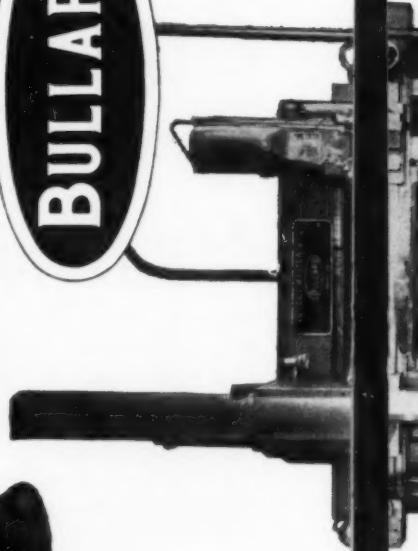
51. Lathes. Variable speed precision lathes, a new series of 11" and 13", spindle speeds to 2000 rpm, are the subject of folder from Sheldon Machine Co., Inc., 4258 N. Knox Ave., Chicago.

52. Drilling Machines. Eight different designs are illustrated and described in folder from McDonald Machinery Co., 1531 N. Broadway, St. Louis 6, Mo. Machines are products of Buffalo Forge Co.

are You interested in

PROFIT DEVELOPMENT

through reduced
machining time
and Lower Costs . . .

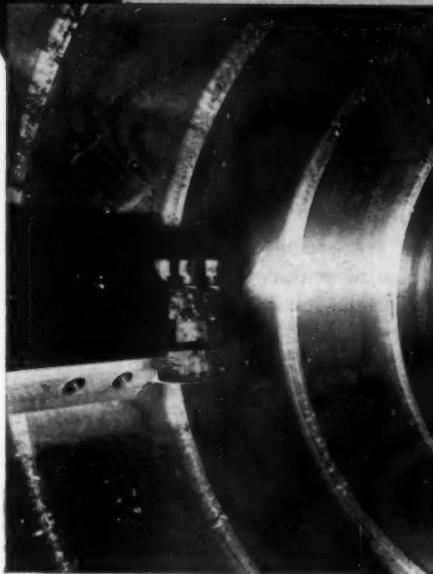


The new 66" Bullard Cut Master,
Model 75 purchased by E.D. Jones & Sons Co.,
Pittsfield, Mass., has reduced from 65 to 48
hours the machining time required for a
.

75 line offers many features and advantages

**75 line offers many features and advantages
to help you — cut costs when cutting metal.**

The part, 68" high, formerly had to be machined in three operations. Now, with an extension on the 62" Ram, a table speed of 9.6 r.p.m., feed of .0208 and $\frac{1}{8}$ " depth of cut, it is possible to machine the entire depth in one operation.



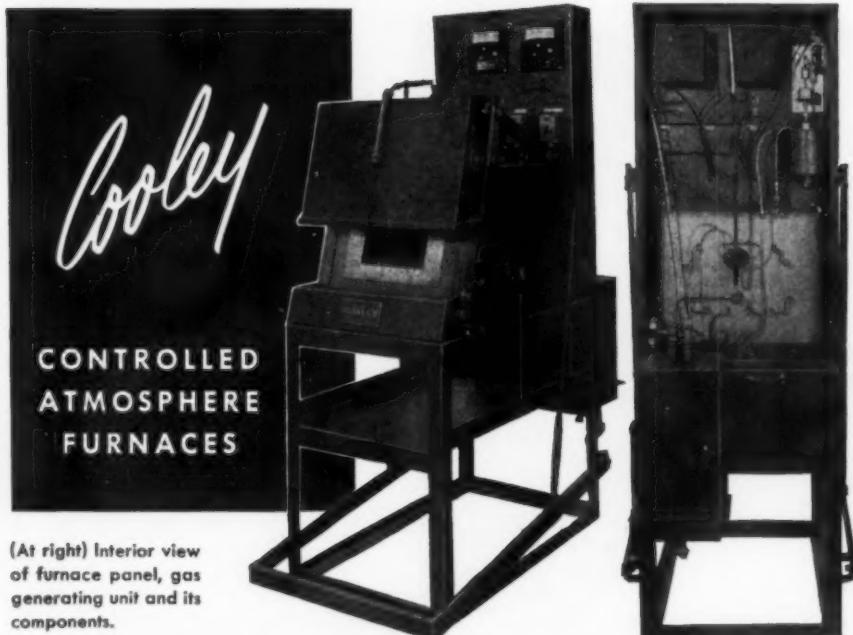
Close-up showing step boring and facing operation with 370 grade carbonyl tool.

Complete details are available from your nearest Bullard Sales Office or Distributor or write

THE BULLARD COMPANY
BRIDGEPORT, CONNECTICUT

Use postage paid card. Circle No. 315

Fully Automatic—Controlled Atmosphere



(At right) Interior view
of furnace panel, gas
generating unit and its
components.

Tool Room Heat Treating Furnaces

Outstanding advantages—ability to consistently harden tool steels, clean and free from scale, with minimum attention from the operator—initial equipment low cost—moderate operating expense.

The atmosphere used in these furnaces is produced from alcohol and water which, when cracked at a constant temperature, produce gases of constant analysis. Research tables provide data for alcohol-water proportions and cracking temperatures for most commonly used steels. No further metallurgical information is needed. Two sizes—10" x 8" x 18" and 8" x 6" x 14"—for operation to 2000° F.

Catalog and complete information will be gladly furnished on request.

COOLEY ELECTRIC MANUFACTURING CORPORATION

36 S. SHELBY STREET • INDIANAPOLIS 7, INDIANA

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NOW-
For Keener, Longer Lasting
Cutting Edges, You Need These
TOOL SHARPENING TWINS

By



Liqui-Breez

WET BLAST HONER

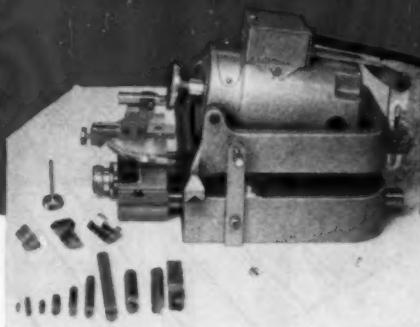
For ANY Tungsten Carbide
and High Speed Steel Cutters



- Increases Cutter Life 300% to 400% and More.
- Reduces Tool Resharpening and Machine-down Time.
- Accomplishes Greater Consistency, Uniform Finishes and Accuracy Between Resharpenings.
- Affords easy Detection of Fractures and Cracks in Carbide Cutters.

**TUNGSTEN CARBIDE
TOOL GRINDER**

For ALL
SINGLE POINT CUTTERS



- Grinds Tools of Any Angle—Right or Left Hand — All Faces and With Any Radii.
- Diamond Impregnated Grinding Wheel.
- Micromatic Feed.
- Ball Bearing Cross Feed with Automatic Gravity Take-Up.
- 110-volt, 60 cycle, single phase, 13000 RPM Universal Motor.
- Capacity Range—Accommodates Single-Point Tungsten-Carbide Cutters From $\frac{1}{8}$ " to $\frac{5}{8}$ " Shanks.

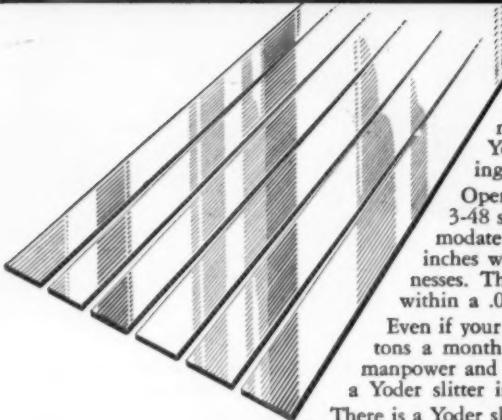
PROTECTED DISTRIBUTORSHIPS AVAILABLE



TOBIN-ARP MFG. CO.

6400 PENN AVE. S. • MINNEAPOLIS, MINN.

**from cold strip to slit strands
IN SECONDS...
YODER
ROTARY MULTIPLE SLITTERS**



A Yoder slitter converts mill-width coils of flat-rolled metal into many variable-width strands in amazingly short time. Speed, coupled with great accuracy and low manpower requirements, makes a Yoder slitter an important factor in keeping production and overhead costs down.

Operated by only two men, the Yoder Type 3-48 slitter illustrated is designed to accommodate standard mill-width coils up to 48 inches wide, in a variety of metals and thicknesses. The slit strand widths can be held to within a .004" tolerance.

Even if your steel requirements are as little as 100 tons a month, the savings to be realized in time, manpower and raw material costs alone will pay for a Yoder slitter in the first few months of operation.

There is a Yoder slitter designed and engineered to meet your requirements, and to speed the delivery of "special" width stock in a wide range of large or small sizes. Send for your free copy of the fully-illustrated, 76-page booklet, "Multiple Rotary Slitting Lines."

THE YODER COMPANY • 5509 Walworth Ave., Cleveland 2, Ohio



ROTARY SLITTING LINES

**PIPE AND TUBE MILLS (ferrous or non-ferrous)
COLD ROLL FORMING MACHINES**

Use postpaid card. Circle No. 318

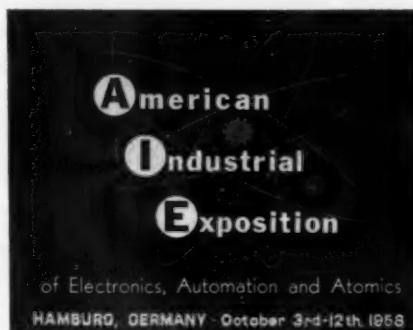
First European Trade Show for American Manufacturers

The first United States trade show to be presented in Europe under private auspices has been scheduled for Hamburg, Germany, October 3-12, 1958. It is named the "1958 American Industrial Exposition of Electronics, Automation and Atomics". Only exhibits of American manufacturers in these fields will be accepted.

More than 40,000 buyers, government purchasing agents, manufacturers, franchise agents, engineers and scientists from all countries are expected to attend.

The show, embracing 200,000 square feet, is sponsored by a group of Los Angeles businessmen in cooperation with the City of Hamburg. A cost analysis for a typical exhibit, based on special rate and transportation arrangements, makes it possible for a manufacturer to exhibit and demonstrate his products at Hamburg with his own sales representatives on the scene for as little as \$2500.00. Intercontinental Trade Shows, the producers of the exposition, will handle all of the details.

Included in a "package deal" are the following: space rental, decorated and furnished standard exhibit booths, installed and dismantled, freight costs USA-Hamburg and return, air transportation, round trip New York-Hamburg and hotel accommodations for two



Booklet containing information on the 1958 American Industrial Exposition is available from Intercontinental Trade Shows, 5757 Sunset Blvd., Los Angeles 28, Calif.

weeks. Also included are the handling of exhibit material at Hamburg, security service, janitorial services, facilities for business meetings, interpreters, panel discussions handled by prominent European businessmen, engineers and officials, and a directory of exhibitors.

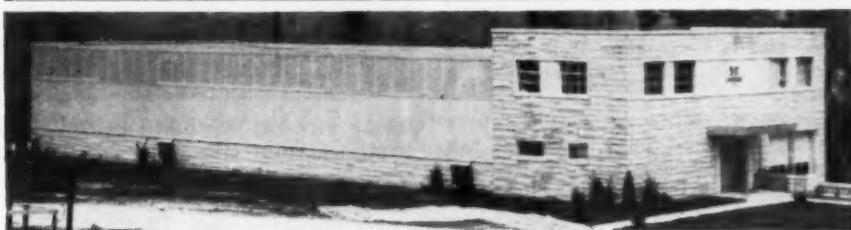
A ten-month's advance advertising and publicity campaign commencing January 2, 1958 will publicize specific products of exhibitors throughout the countries of Europe in ten languages. More than \$50,000 has been allocated specifically for this purpose.

**GRINDS
THEM ALL!**

Radii, angles or tangents . . .
straight or tapered flutes . . .
square, radius or ball ends . . . this
machine grinds practically any special
or standard cutting tool quickly, accu-
rately, economically. Learn how you can
reduce tool costs, improve work quality, cut
machining time — write for Circular No. S455-8.

PRATT & WHITNEY
CUTTER and RADIUS
GRINDER

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New Surface Plate Plant

The Herman Stone Co., has opened a new manufacturing plant at Mount Airy, N. C. It is located near other production facilities opened several years ago by the company at the quarry of the North Carolina Granite Corp.

According to Donald V. Porter, president of Herman Stone, the Mount Airy granite has a high silica content which provides approximately 30% quartz and a desirable mineral balance for making surface plates. The quarry is considered

the largest seam-free deposit of granite in the world, allowing the manufacture of surface plates of almost any size. The only limiting factors are transportation facilities.

M. A. Ford Co. Moves

The M. A. Ford Co. has moved from 732 W. River St., Davenport, Iowa, to 1545 Rockingham Rd. in that city.



NEW FACTORY. Keo Cutters, Inc., Detroit, now has more space for the manufacture of Woodruff key seat cutters, lathe mandrels, center drills and center reamers. This modern factory has been built at 25040 Easy St., Warren, Mich.

Johnson Bronze buys plant

Johnson Bronze, of New Castle, Pa., has purchased the Apex Bronze Foundry Co., Oakland, Calif. After the modernization program is complete, this new subsidiary will be able to provide delivery on plain cylindrical, flanged,

self-aligning bronze bearings, and miscellaneous bronze castings.

Bearings of a special nature, or where there is quantity of a size required, will continue to be supplied by the main plant in New Castle.



MILLING CUTTERS

*A Complete Line of the
Highest Quality*

Whatever your needs, you can get the right standard or special milling cutters to do the job better from one convenient source—Pratt & Whitney. Like all other P&W Cutting Tools, you can be sure they'll cost you less in the long run... because they run longer! Write now for complete information. Pratt & Whitney Company, Inc., 22 Charter Oak Boulevard, West Hartford, Conn.

AVAILABLE FROM

STOCK AT THE P&W BRANCH OFFICE NEAR YOU



PRATT & WHITNEY

FIRST CHOICE FOR ACCURACY

MACHINE TOOLS • GAGES • CUTTING TOOLS

Use postpaid card. Circle No. 320

CUT
· Smoother,
More Accurately
and Last Longer

Because . . . special P&W surface treatment gives far greater resistance to chip abrasion, smoother grinding provides maximum resistance to wear. Cutting diameter, shank diameter and chamfer are finished on same centers . . . meet highest standards for size and concentricity. Correct design with ample chip clearance insures a smooth, clean-cut finish. Write for complete information.

P & W

REAMERS
AVAILABLE FROM STOCK IN A COMPLETE RANGE OF SIZES
AND SHAPES AT THE PRATT & WHITNEY OFFICE NEAR YOU

Use postpaid card. Circle No. 321



F. H. Chapin



T. L. Strimple



C. W. Simpson



D. W. Branning

Appointments and Promotions

Changes in Executive and Production Personnel

Name	Company	To	Position
Frederic H. Chapin	National Acme Co. Cleveland, Ohio	Has resigned his position as President Same	President
T. Laurence Strimple	National Acme Co. Cleveland, Ohio	Has resigned his position as Executive Vice-President	President
Charlie W. Simpson	National Acme Co. Cleveland, Ohio	American Brass and Machine Div., Ann Arbor, Mich.	Manager
Don W. Branning	Sundstrand Machine Tool Co. Detroit Sales Office		



J. E. Collins



W. F. Kruspe



Wendell F. Carney



Denton Hassell

Changes in Executive and Production Personnel

Name	Company	To	Position
J. E. Collins	Valvair Corp., Sinclair-Collins Valve Co., Akron, Ohio	Same	Board Chairman
W. F. Kruspe	Valvair Corp., Sinclair-Collins Valve Co., Akron, Ohio	Same	President, Gen. Mgr.

Changes in Sales and Service Personnel

Name	Company	To	Position
Wendell F. Carney	Taft-Pearce Mfg. Co., Woonsocket, R.I.	Same	General Sales Mgr.
Denton Hassell	Carmet Div., Allegheny Ludlum Steel Corp., Ferndale, Mich.	Same	Mgr., Distributor Sales

HIGH Precision at LOW Cost

THE PRATT & WHITNEY SIGMATIC COMPARATOR...

a moderately priced instrument that combines the simplicity and dependability of mechanical gaging with unusual accuracy. Magnification range from 300X to 5000X. Repeatability to millionths of an inch. Self-contained, readily portable. For a wide range of external gaging operations, Ask for Circular No. 599, Pratt & Whitney Company, Inc., 22 Charter Oak Blvd., West Hartford, Conn.



PRATT & WHITNEY

FIRST CHOICE FOR ACCURACY
MACHINE TOOLS • GAGES • CUTTING TOOLS

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draws 5½" deep in one SMOOTH OPERATION!



Rodgers smooth acting, 100 Ton Platen Press with high speed circuit for fast approach and return of platen. Has upper knock-outs as well as pneumatic die cushion. Provides accurate clamping pressures to insure smooth, even draws.

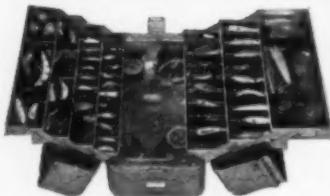
RODGERS PLATEN PRESS forms 220 tackle box bottoms per hour with a single draw 5½" deep and retains the leather-grained embossed pattern without distortions or fractures.

This strong, lightweight, rust-proof and moisture-proof aluminum tackle box would delight the heart of the most finicky salt or fresh water fisherman—it's the new Model 1000, in the line of famous quality tackle boxes made by the UMCO Corporation of Minneapolis, Minnesota—"Land of 10,000 Lakes".

A Rodgers 100 Ton Platen Press was chosen by UMCO to draw their boxes because of its extremely smooth action and efficient operation. The entire box is formed in three operations—the bottom, which is 18" long, 9" wide, is drawn 5½" in depth—the top is formed in one draw and cut apart to form the two top halves—the carrier band, of 18 gauge aluminum, is also formed in a single operation. Material used in both top and bottom is 18 gauge, leather-grained, embossed aluminum.

It requires a really smooth operating press to make these deep draws and still retain the original embossed pattern and turn out top quality production without fractures or scrap—reason enough that UMCO selected a Rodgers Press to do the job.

Rodgers Platen Presses are offered in capacities ranging from 50 to 500 tons. Write for more information to suit your operations.



Light, rust and moisture-proof aluminum tackle box having 53 plastic lined compartments, by UMCO.



Model 1000 UMCO tackle box puts lift at bottom—where it belongs.

Rodgers Hydraulic Inc.

7453 Walker Street

• Minneapolis 26, Minnesota



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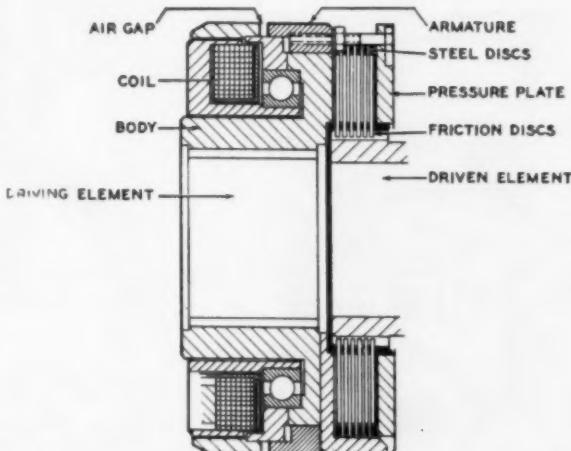
Magnetic clutch for wet or dry operation

Comparatively narrow axial, small radial dimensions, complete isolation of the magnetic assembly from the integral mechanical parts, and compact, precision assembly of all component parts are design features of the Fawick magnetic clutch. It is furnished in stationary field or brush types and may be adapted to dry operation.

There is fast operating speed in both engagement and disengagement. Delay time and "residual drag" are reduced to a minimum by effective isolation of the magnetic assembly from the clutch friction components.

The clutch provides complete control of acceleration or deceleration, plus good torque under all rated conditions—with instant remote control through push buttons, relays, or limit switches. It is easily adapted to modern machine tools, and has a wide range of bore sizes ranging from 2 to 13 inches.

Fawick Airflex Div., Fawick Corp.,
9919 Clinton Rd., Cleveland 11, O.



Shown above in released position, the clutch responds instantly to application of current to the DC coil. The magnetic action on the armature pulls the pressure plate and friction discs tightly together, producing high torque clutch action. Upon release, the action of the springs mounted on the steel discs produces complete disengagement.

Bar and tube printer

A small offset wire bar and tube printer is designed to handle material from $\frac{1}{8}$ " to 4" o.d. without changing guide wheels. The power unit has a magnetic starter that activates motor as material passes through open limit switch. This eliminates excessive build-up of ink on the offset printing wheel

for as little as
\$22.00
 COMPLETE
 IN U.S.A.

For This Production Boosting
"TRICO-MIST"
COOLANT SYSTEM
 With Flexible Armored Coolant Lines
 And Kwik-Change Nozzle.

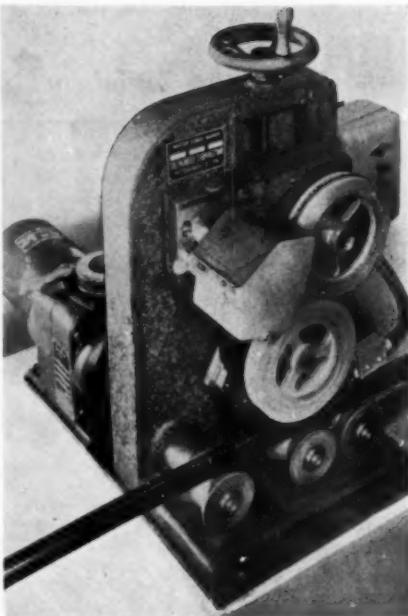


For drilling, tapping, milling, sawing, grinding, etc. Removes heat from cutting edges of tools and work. Feeds can be increased considerably, finer finishes and accuracy are obtained. TRICO-MIST absorbs heat, thereby quenching it faster than flood coolants which only transfer it. Chips slide freely up the tool face and are blown away automatically. Simple needle valve controls size and volume of mist spray. Attaches to shop air line. Available with one and five gallon containers — single or multiple outlets — single or dual valve control.

SEND FOR BUL. 37

TRICO FUSE MFG. CO.
 MILWAUKEE WIS U.S.A.

Use postpaid card. Circle No. 324



Pannier printer—marks $\frac{1}{16}$ " to 4" o.d. material.

and assures clean, clear marking. Printer is available as either left or right hand feed so that it fits into conveyor line system without disrupting present line movements.

Unit will print a continuous message set on 24" offset printing wheel in type sizes from 1/16" to 1". A 1/2 hp, 3 phase, variable speed motor chain drives, with a floating idler sprocket, only the marking head to forward material through unit with a very light printing pressure. Speed can be safely controlled from a minimum of 45 lineal feet to a maximum of 450 lineal feet per minute. Material being marked is supported by three fibre rolls that are not powered. The standard support rolls are designed primarily for round material but will handle a variety of shapes; some extruded shapes may re-

quire special support rolls to assure clean, smudge-free impressions.

The Pannier Corp., 203 Sandusky St., Pittsburgh 12, Pa.

Use postpaid card. Circle No. 82

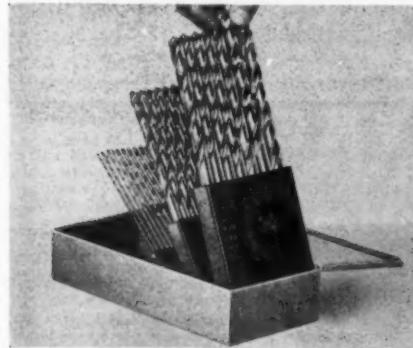
Drill sets in fractional, wire and letter sizes

Three new taper length drill sets—which include taper length drills in fractional, wire and letter sizes packaged in convenient folding metal index cases—are now being offered as standard stock items by Ace Drill Corp., Adrian, Mich.

The No. 29 Halfpak fractional size set consists of 29 taper length drills ranging in diameter from $1/16"$ through $1/2"$ by 64ths. The No. 60 Wirepak set contains wire size taper length drills from 1 through 60 inclusive, while letter sizes A through Z are included in the No. 26 Letterpak set.

All drills in these sets are made of selected high speed steel heat treated in a continuous furnace to give tough, uniformly hardened mill length bars. The drills are all manufactured by the ground-from-the-solid process to give them sharper, keener cutting edges and longer life.

Use postpaid card. Circle No. 83



Ace taper length drill set.

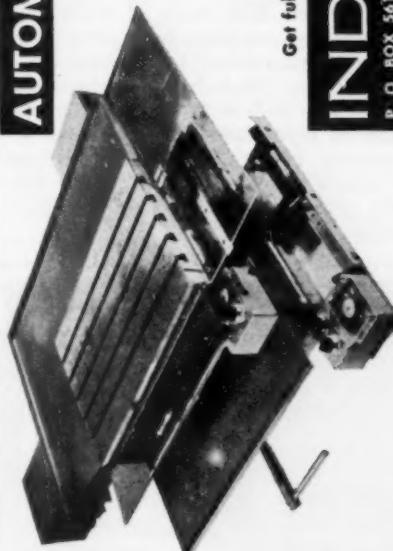
January, 1958

AUTOMATIC POSITIONING SPACER TABLE

- Much lower cost of ownership than you would imagine.
- Average machine can master operating mechanisms in 15-20 minutes.
- Accuracy of Spacer Table depends solely on accuracy of spindle under which it is used.
- Enables you to perform heavy duty, production drilling.

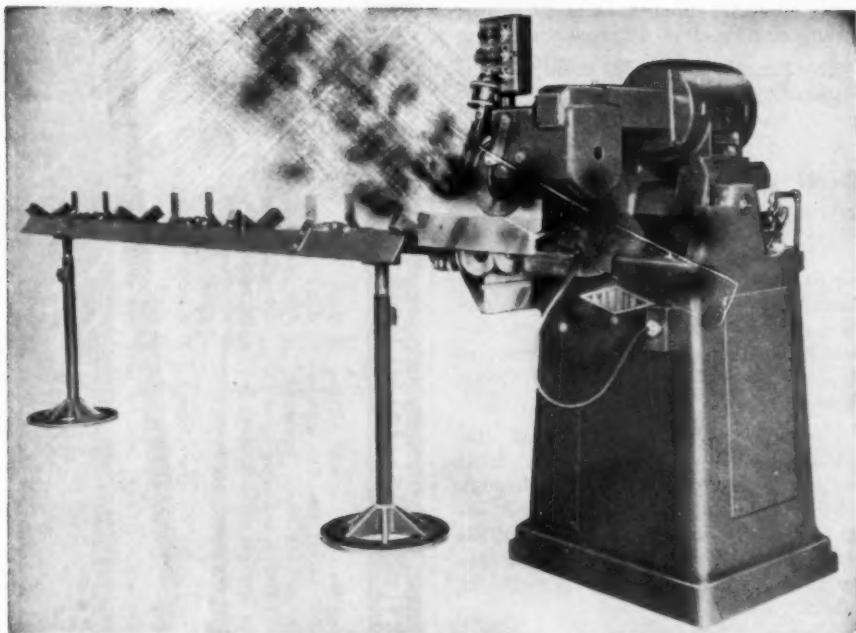
Get full details, specifications. Send for your copy of "Spacer Table" Folder.

INDUSTRIAL CAS/CO.
P. O. BOX 561, CLIFTON, N. J. (Phone COM 3-3081)



Use postpaid card. Circle No. 325

189



Roller Pipe Cutters

A 2B and 2BA series of roller pipe cutters have recently been introduced. Designed to replace the Landis No. 2 style cutter, they have an increased capacity of $\frac{1}{8}$ " to 3" and offer higher rates of production. The machines incorporate many new design principles to assure economical and trouble free pipe cutting and nipple blanking operations.

The cutters can be supplied as manually or air operated machines. Their new design features include: sturdy construction; two speed worm driven gear box; heat treated alloy steel cutter discs for maximum life and universal size adjustment.

Landis Machine Co., Fifth & Church Sts., Waynesboro, Pa.

Use postpaid card. Circle No. 84

**DYKEM
STEEL BLUE**

Stops Losses

**making Dies and
Templates**

**Popular package
8-oz. can fitted
with Bakelite cap
holding soft-hair
brush for applying right
at bench; metal surface
ready for layout in a few min-
utes. The dark blue background
makes the scribed lines show up in
sharp relief, prevents metal glare.
Increases efficiency and accuracy.**

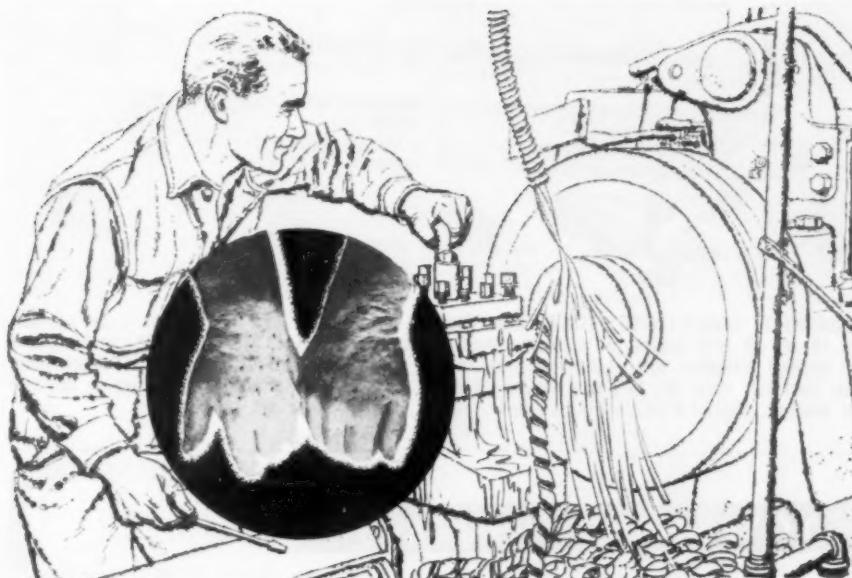
**Write for sample on company letterhead
THE DYKEM COMPANY
2301G North 11th St. • St. Louis 6, Mo.**

SPECIMEN

With DYKEM Steel Blue

Without DYKEM Steel Blue

Use postpaid card. Circle No. 326



Why DERMATITIS is a needless penalty

Dermatitis caused by the oils, greases and abrasives used in machine shop work can be prevented. Simply. Inexpensively. With a basic program that safeguards and improves the hygiene of workers—the West Program of Dermatitis Prevention and Control.

How does it work?

No contributing source of dermatitis is overlooked. Specially formulated handcleaners insure personal cleanliness. Antiseptic creams help protect exposed skin areas. "Vinylite" aprons and armguards prevent clothing contamina-

tion. Other specialties protect against bacteria infections.

Workers are protected against discomfort, lowered morale and lost time.

Management is protected against the costs of medical care, absenteeism, replacement training, sacrificed quality and lost production.

Why not discuss the West Program of Dermatitis Prevention and Control with one of our specialists? His recommendations will help you eliminate the needless penalty of dermatitis. No obligation of course. Just send the coupon.

Programs and Specialties
for Protective Sanitation
and Preventive Maintenance



WEST DISINFECTING DIVISION

WEST CHEMICAL PRODUCTS INC.
42-16 West Street, Long Island City 1, N. Y.
Branches in principal cities
In Canada: 5621-23 Cagrain Ave., Montreal

- Please send your 24 page booklet on dermatitis control.
 Please have a West representative telephone for an appointment.

Name _____

Position _____

Mail this coupon with your letterhead to Dept. 17

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MICROMETER DEMONSTRATES OVERRSIZE dimensions of new "Select B FM" ground die steel. Available in 18 and 36 inch lengths, it is manufactured oversize by .010 and .012 so that it can be ground to nominal dimension after heat treatment. In this photo, new anti-rust wrapping is shown above the steel bar. Above this is a new package of wood, which prevents nicking or scratching by shipment or handling. Special Products Div., Latrobe Steel Co., 2626 Ligonier St., Latrobe, Pa.

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MACHINING METHODS
MEAN
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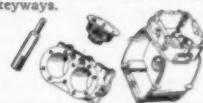
192



COCHRANE-BLY: Metal Sawing Machines for CUTTING ferrous and non-ferrous materials in regular or irregular shapes up to 20" in diameter.



TAYLOR and FENN, Machine Division: Machines for MILLING a full variety of straight and spiral keyways.



THE CLEVELAND TAPPING MACHINE CO.: Standard and Special Machines for drilling and TAPPING... incorporating rotary index tables.

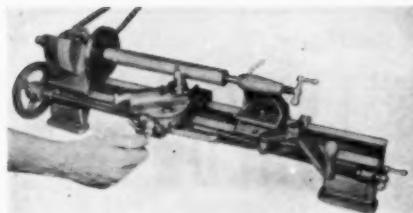


THE TOWNSEND MFG. CO.: Hopper Fed Secondary Operation Machines for TURNING, drilling, pointing, grooving of headed blanks.

MACHINE and TOOL BLUE BOOK

Bench lathe's performance belies its size

Little Giant bench engine lathe is capable of precision work on metal, wood, and/or plastics. Although small and compact (bed length 30-in., cutting range 20-in., and swing 7-in.) the lathe is ruggedly constructed and is claimed to do work comparable with that of larger lathes. Power require-



Little Giant lathe—bed length 30", swing 7".

"Puts OUR
Factory
in YOUR
Own
Backyard!"



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"SOLD ONLY THROUGH AUTHORIZED INDUSTRIAL DISTRIBUTORS" is the Blue Devil sales policy because it makes sure you get the socket screws you want when you need them. For better service, call your local Blue Devil distributor today.



Actual cross-section diagram shows how cold forming of Blue Devil Socket head insures unimpaired fiber continuity.

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DIAMOND WHEEL DRESSERS

Made of selected, full individual stones, mounted in 7/16" diameter x 6" long cold rolled shank.

Karat	Regular Price	Our New Price
1/4	\$ 6.00	\$ 2.85
1/2	12.00	5.00
3/4	21.00	7.50
1	30.00	10.25
1 1/2	54.00	15.00
2	75.00	20.00
2 1/2	102.00	26.00
3	130.00	32.00

These diamonds can be set in any shank to your specifications for \$1.00 each extra.

Order today—Immediate Delivery From Stock!

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Machinery Exchange, Inc.

Dealers in Tool Room Equipment

Dept. A, 251 Centre St.
Tel: CANal 6-5575, New York 13, N.Y.

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194

ments are 1/4 hp at 1750 rpm. Featured is a three-speed pulley.

Bed ways are machined with double Vs to 60°, its compound swivels 360° on a center pilot and is locked with two T-slot bolts. A hollow tapered drive shaft accommodates boring tools, tapering cutters, and the like.

List price of the bench lathe is \$99.50, with two male and two female centers, face plate driving dog, cutting tool, and an armature driving dog, but without motor. Available at extra cost are saw, chuck, disc sander, and grinder.

King Corp., 2157 Euclid Ave., Cleveland 15, Ohio.

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New method for hard surfacing parts

Kenplate is an adaptation of Ken-nametal cemented tungsten carbide that may influence the process of hard facing metal surfaces for protection against abrasion and wear.

Material consists of small hexagonal plates of cemented tungsten carbide assembled in a continuous pattern on an adhesive glass fiber backing to provide flexible sheets or strips for application on flat or curved surfaces. The adhesive backing holds the small



Hexagonal plates of cemented carbide mounted on a flexible adhesive backing hard surface parts against abrasion and wear.

MACHINE and TOOL BLUE BOOK

plates in position while they are being bonded by epoxy adhesives, silver solder, or conventional brazing materials to provide continuous surfaces that utilize the wear-resistance properties of hard tungsten carbide.

The flexible backing simplifies application since the basic sheets can be cut or joined in multiples to form practically any required size or shape, to

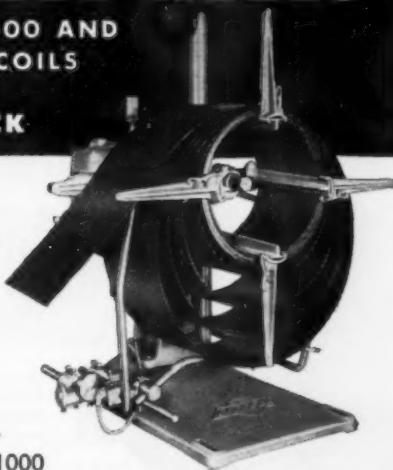
cover flat surfaces or for wrapping around curved surfaces.

Two sizes of hexagons, each in three thicknesses, are being made. They are 0.425 and 0.210 inch across the flats. Thicknesses are .040, 1/16, and 1/8 inch for 0.210-inch plates, and 1/16, 1/8, and 1/4 inch for 0.425-inch plates. Thin plates are recommended where the surface is not subject to impact and where

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Littell Motor
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abrasion is not extremely severe, as on the ways of machine tools. Where a surface may be subject to impact, the thicker hexagons are used.

Product is supplied in strips 6 inches and 12 inches long. The 0.210-inch plates are made up in 13 widths, from 0.65 to 4.20 inches. The 0.425-inch plates

are made up in 11 widths, from 0.85 to 5.95 inches.

Typical applications are wear plates for mills, liners for ball mills, chute liners for abrasive materials, machine tool ways, banding joints on well drills, and mold liners for abrasive materials. Kennametal, Inc., Latrobe, Pa.

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The
FEDERAL
"55"
gives you

OVERSIZE DIMENSIONS

Eliminates the need for larger,
more costly equipment! Boosts
production on big and bulky jobs!

Here's a press that will handle big, bulky jobs ordinarily requiring larger, more expensive equipment. Equipped with foolproof air clutch, its speed is increased many times, safely and with better control. Only the finest components are used in the "55". Workmanship, as in all Federal Presses, is unexcelled. Flywheel or geared. Mechanical clutch standard. Write.

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FEDERAL *Open back
Inclinable* **PRESSES**

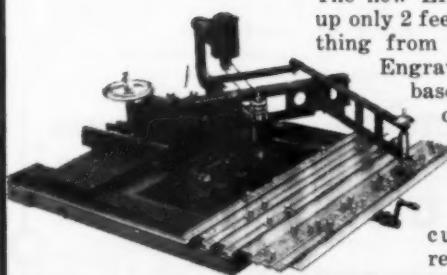
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Now— NO plate too small— 213B

NO panel too big

**NO
size limits
on engraving**



The new ENGRAVOGRAPH Model I-R takes up only 2 feet of bench space and engravings anything from tiny nameplates to giant panels.

Engraving chassis can be detached from base and placed directly on workpiece of any dimension. Smaller plates can be easily clamped in a self-centering workholder which is standard equipment. New sturdy pantograph construction; heavy duty cutter spindle; two-way depth regulator.

**Send for
booklet MR-1**

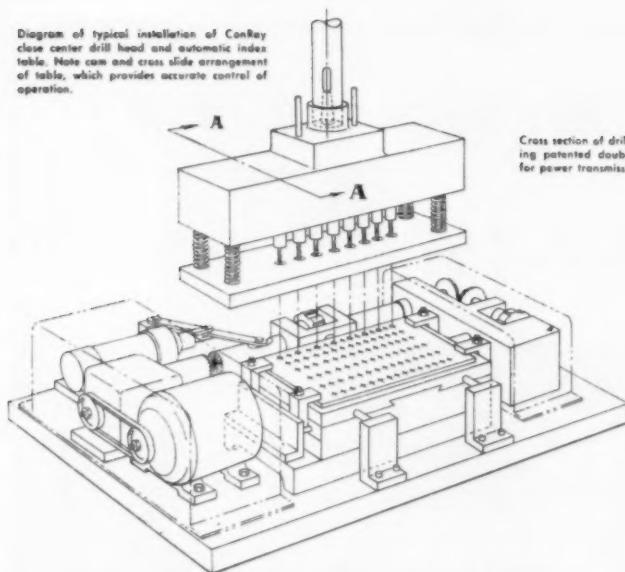
new hermes ENGRAVING MACHINE CORP.
13-19 University Place, New York 3, N.Y.

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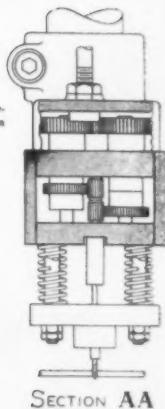
January, 1958

197

Diagram of typical installation of ConRay close center drill head and automatic index table. Note cam and cross slide arrangement of table, which provides accurate control of operation.



Cross section of drill head, showing patented double gear train for power transmission.



Drill Head for Close Center Drilling

The multiple drill head attachment and an automatic index table can produce any type pattern of holes on a close center. They can drill linear, oval, circular, zig zag or more complex and irregular arrangements, such as used in parts for business machines, appliances, automotive, and aircraft.

The ConRay drill head attaches easily to a drill press, spindle or other power unit, and requires only one source of power. When used on a drill press, the

revolving spindle of the drill transmits the required power through a patented two-level gear train, causing all drills to rotate in the same direction.

In operation, the drill head remains stationary. Work is held in a patented index table containing two cross slides which regulate the positioning of the work under the drill head.

The ConRay Corp., Dept. RH, 29 W. Apple St., Dayton, O.

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CLOSED **TRADE** **CLOSED** **MARK**

OPEN **PLAIN TYPE** **AUTOM** **OPEN**

THREE-FOURTHS **CONTINUOUS HINGES** **OFFSET TYPE**

OPEN

All hinges shown can be furnished with special holes, cutouts and bends to blue-print in metals to suit the job.

THREE-FOURTHS **OFFSET**

AUTO MOULDING & MFG. CO.
1110 E. 87TH ST.
CHICAGO 19, ILL.

SPECIFICATIONS
Open width $\frac{7}{8}$ " to 6"
Gage Material .040 to .125
Pin Diameter .101 to $\frac{1}{4}$ "
Lengths to 120"

SEMI-OFFSET

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MACHINE and TOOL BLUE BOOK

MAXIMUM SAFETY AND WORK EFFICIENCY

NEW CONCEPT IN PRESS BRAKE DESIGN

NEW!

di-acro

Hydraulic Press Brake with STROKE CONTROL



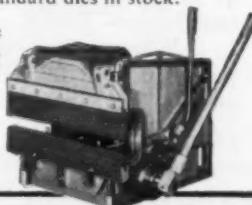
 **STROKE CONTROL** means that you set the most practical length of stroke for each job—60 strokes per minute at $\frac{1}{4}$ " stroke, 24 strokes per minute at $1\frac{1}{2}$ " stroke. The cam shaft does not make a full revolution as is true with flywheel driven press brakes.

Regardless of length of stroke used, the *ram speed is always constant* to insure

safe, smooth, efficient operation. No violent whipping action of material.

Twelve tons of smooth hydraulic power is applied through a mechanical cam drive which assures perfect, positive alignment of bed. Ram can be "inched" or immediately backed-off. Capacity is 16 gauge steel across 36" bed. Wide variety of standard dies in stock.

For short run or experimental work use the Di-Acro hand operated Press Brake. Eight tons of power forms 16 gauge steel across the 24" bed. Uses standard dies.



pronounced
die-ack-ro

Write for Press Brake literature



O'NEIL-IRWIN MANUFACTURING CO.

413 8th AVENUE, LAKE CITY, MINN.

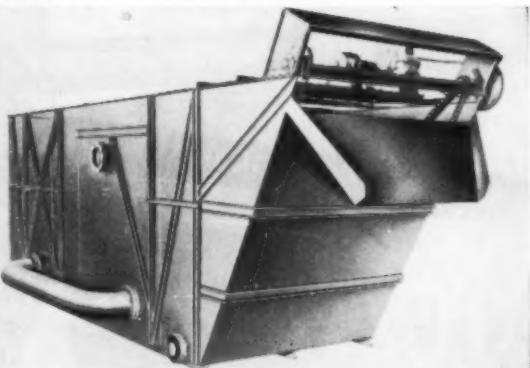
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High Capacity, Micronic Filtration

The Delpark tubular screen vacuum filter has been increased in capacity to handle flow rates to 1000 gpm on water. Designed specifically for the filtration of grinding coolants and cutting oils, it is claimed to make micro-inch finishes more easily attainable.

Filtration is accomplished by tubular screen elements manifolded into a suction header box in which a vacuum equivalent to 18 inches of mercury is maintained.

Automatic, self-cleaning is accomplished by a float activated micro-switch which energizes an air valve and cylinder and reverses the coolant



Delpark tubular screen vacuum filter handles flow rates to 1000 gpm.

flow through the manifold into the tubes, knocking off the filtered deposits held on the periphery of the tubular screens. The sediment from the

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1958 MACHINE TOOLS "Cyclopedia"

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screens is removed by chain-driven flights which deposit the sludge in a tote box for disposal. The flow of coolant to or from the filter is not interrupted during the cleaning cycle.

Industrial Filtration Co., Dept. FMH-290, Lebanon, Ind.

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Roller stock pusher

Amcor roller stock pushers align strip stock against the back gage in pro-



Amcor roller stock pushers and stock buckling.

gressive and compound dies. The roller feature permits easier feeding to elimi-

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They cut costs
because they cut
operations...
75% or more!

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2-DIMENSIONAL
PROFILING
ON ANY
VERTICAL
MILLER!**



**WITH THE NEW
REGENT R-200
FLUID MOTION
DUPLICATOR TABLE...**

Fastest method of Profile Milling

Tighten just 4 bolts and R-200 is mounted on any vertical miller! It combines all the extreme sensitivity of true fluid motion with the extra rigidity of its base-casting-mounted follower arm.

Single lever control enables inexperienced operators to produce intricate contoured parts. Rugged adjustable friction brake. Table "floats" on ball-bearings in circular raceways.

Capacity: 6" x 6"
1 to 1 ratio with master

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LITERATURE

J. M. Kalins & Co.

1575 Railroad Avenue, Bridgeport 5, Conn.

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202

nate stock buckling, speeds up production, reduces operator fatigue.

Quickly adaptable to all work specifications, simple and easy to install. Just mill a slot in the stripper plate, drill a hole in die block and stripper plate, insert roller stock pusher. Convenient tracing template for slot and hole locations is supplied with each pusher.

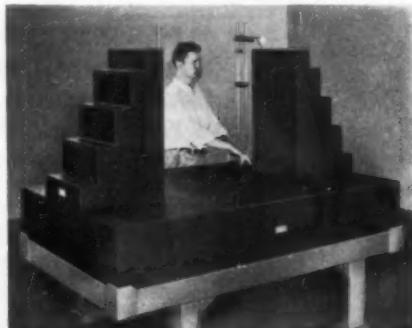
Applied Mechanics Corp., Dept. BJ,
Grand Rapids, Mich.

Use postpaid card. Circle No. 90

**Large granite angle plates
held to close tolerances**

Extremely large, black granite (dia-base) angle plates, made to the same degree of precision as small angle plates, are being announced by Rahn Granite Surface Plate Co., 639 N. Western Ave., Dayton 7, Ohio. They are weighed in tons, but measured in millionths of an inch. Illustrated is a matched pair having bases 18" x 18", with 30" heights, weighing one ton. The tolerance for squareness is .00012" in the 30" height. This averages only 4 millionths of an inch per inch of height, which is less than 1 second of arc. The top lips of both angle plates are finished parallel to the bases with a f.i.r. tolerance of .0001" over the pair.

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Rahn angle plates. This pair weighs one ton.



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24 hours**

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**division
BELOIT TOOL CORPORATION . . Beloit, Wisconsin**

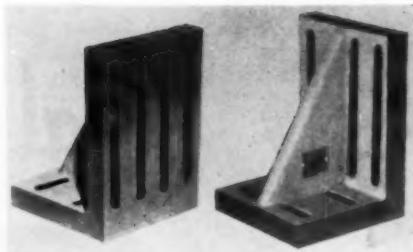
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Slotted angle plates

These slotted angle plates are versatile because the workpiece to be machined or inspected can be bolted in the exact position desired. The angle plate can then be bolted to the machine table, fixture or other working surface.

Monarch Tools, Inc., Lynwood, Calif.

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WILSON "ROCKWELL"—
THE WORLD'S STANDARD OF HARDNESS TESTING ACCURACY

WILSON "ROCKWELL"

DIAMOND
"BRALE" PENETRATORS



Your hardness testing is no better than the penetrator

A FULL WILSON LINE
TO MEET EVERY HARDNESS
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Every WILSON Diamond "BRALE" Penetrator
gives you:

a flawless diamond • no chips, no cracks
precise accuracy of penetrator angle

Microscopic inspection finds and rejects any diamond with the slightest imperfection...comparator check, with hundreds of magnifications, assures essential accuracy and uniformity of penetrator angle...your complete assurance of—

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No keeping of sub-standard parts
No risking good name with customers

The matching accuracy of WILSON Diamond "BRALE" Penetrators and "ROCKWELL" Hardness Testers, insure perfect hardness testing...EVERY TIME.

ACCO



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AMERICAN CHAIN & CABLE

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For
complete data
write for
Booklet DH-327

For fast, economical cutting of flat metal shapes there are

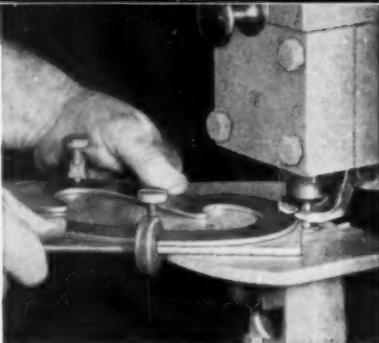
7 MODELS OF Campbell Nibbling Machines

...with cutting capacities ranging from 3/32" mild steel for MODEL 0 machine to 1/2" mild steel for MODEL 530, in sheet sizes from 16" or less, to 72".

CAMPBELL NIBBLERS are making tremendous savings in time and money for hundreds of users in aircraft and other metal-working plants.

...in fast cutting of ferrous and non-ferrous sheet metals or composition sheets.

...for moderate production runs or experimental development work.



- CAMPBELL NIBBLERS cut from 40 to 60 times faster than drilling or filing. A fast-moving punch (350 to 900 strokes per minute) operating over a die, nibbles out the design, taking a small "bite" with each stroke of the punch.

- ...for any and all kinds of shapes
- ...for either inside or outside cuts
- ...with no distortion of material—no internal strains
—no invisible fractures—no burr
- ...with a "nibbled" edge that is sufficiently smooth to require very little finishing and sometimes none

CAMPBELL standard punches are made double end to double work life and halve the cost. Prices are so low (starting at 40c each, or 20c per working end) that new punches cost less than regrinding dull ones.

Here is a quick picture of CAMPBELL NIBBLING MACHINE Capacities

Campbell Nibbler Model #	Sheet Width	WORKING CAPACITY	Strokes per Minute
		Mild Steel	Alloy Steel
0.....	16".....	3/32".....1/16".....	900
1A.....	20".....	3/16".....1/8".....	375-650
430.....	60".....	3/8".....1/4".....	350-525
436.....	72".....	3/8".....1/4".....	350-525
530.....	60".....	1/2".....5/16".....	350-525
2524.....	48".....	1/4".....3/16".....	375-650
2536.....	72".....	1/4".....3/16".....	375-650

Economical
"throw-away"
punch and die



Send for this
catalog for com-
plete information
on this versatile
production and
experimental tool

**Campbell Machine Division
AMERICAN CHAIN & CABLE**

937 Connecticut Avenue, Bridgeport 2, Connecticut



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Long tang wrench

A 15° Angle, Vitalloy forged construction wrench features a long tang for aligning work on the job. Correct proportion of tang to handle gives ample leverage and quick insertion into bolt holes.

Openings are deep throated, accurately milled or broached, and uniform to size. Wrench is drop forged from Billings special analysis alloy steel, heat treated. It has a heavy chrome plated



Billings and Spencer wrench—15° angle.

finish over copper and nickel, a range of openings from $\frac{1}{8}$ " to 2". The Billings and Spencer Co., Dept. DR, Hartford, Conn.

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DRILL-REAM
COUNTERSINK
COUNTERBORE
**DO ALL
FOUR**
on the same drill press
with
quadrill

FOUR POSITION
DRILLING & TAPPING
TURRET HEAD
•
FITS ALMOST ANY
DRILL PRESS

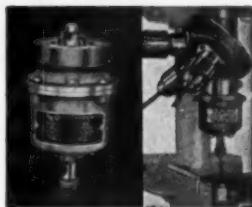
No need to set up for each operation. A simple rotation of this turret head brings any of four drills or cutting tools into position. Speeds production—cuts cost! Specify size and make of drill press when ordering QUADRILL.

For Fast Accurate Tapping Operations
use the **quadtapper**

You get precision tapping at high speed by simply attaching the QUADTAPPER to any of the four spindles of the QUADRILL. Write today for complete information on both these production tools.

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1846 BUSSE HIGHWAY • DES PLAINES, ILL.



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MACHINE and TOOL BLUE BOOK

INVEST JUST 12 PENNIES A DAY



TO SAVE DOLLARS THE *Robbins* WAY

Robbins angular tooling equipment often pays for itself the first few times you use it . . . but let's be conservative. Let's talk about writing off the cost over ten years. (About half the useful life of a "Magna-Sine")! Written off in this manner, the Model A-5 Magna-Sine illustrated represents an investment of around twelve cents a day!

This equipment saves dollars of valuable toolroom time on every job. Set-ups that require *hours* by other methods take just *minutes* the Robbins way. Set up to machine, grind or inspect any angle in just four simple steps: (1) Look up required angle in Table of Constants furnished with unit, (2) Select gage blocks indicated, (3) Place blocks between base and sine bar swivel block, (4) Secure the work . . . and you're ready to go!

This simple, fast, sure method sets up any angle, single or compound, right or left hand, without V-blocks, angle plates or complicated "build-ups." Complete range of models and sizes puts Robbins precision equipment within the reach of every shop. Write now for literature.

OMER E.
24800 PLYMOUTH ROAD

DEPT. A

Also manufacturers of special machinery, automatic assembly machinery.

COMPANY
DETROIT 39, MICH..

9937

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January, 1958

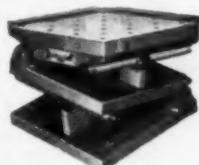
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HEAVY DUTY SINE PLATE
FOR MACHINING



"MAGNA-SINE" WITH
MAGNETIC TABLE



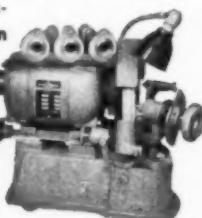
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LIGHT MACHINING

STOP WASTING DRILLS

NEW LIFE for OLD DRILLS with
BLACK DIAMOND DRILL GRINDER

FOR DRILLS UP TO $\frac{3}{4}$ "

The BLACK DIAMOND Drill Grinder restores a worn drill to like new precision sharpness . . . in 10 seconds! Any inexperienced man (or woman) is an expert grinder with this unit. Both lips ground at once . . . web-thinning equally simple! Pays for itself many times over!



FOR DRILLS UP TO $\frac{1}{2}$ "

The WORCESTER Drill Grinder (now manufactured by Black Diamond) sharpens 2, 3, or 4-lip drills, flat, flat twisted or chucking, up to $\frac{1}{2}$ ". Clearances are easily and instantly changeable, feeding is controlled by micrometer adjustment.



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208

Feeder has 25 cu. ft. hopper capacity

Rolling or sliding parts in random lengths and various diameters can be fed automatically and at continuous high-production speeds with the Feed-all Model 3000. The machine handles rolling parts up to 5" diameter x $2\frac{1}{2}$ " long, with a minimum $\frac{1}{8}$ " thickness; sliding parts up to 2 $\frac{1}{2}$ " diameter x 6" long. The automatic elevating feeder picks up parts from the loading hopper, carries them to desired feed height on



Model 3000 feeder—handles parts to 5" x $2\frac{1}{2}$ ".

JIG BORING

and

Large Precision Machining

Done to your specifications

WE HAVE 22 JIG BORERS

KIDDE PRECISION TOOL CORP.

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MACHINE and TOOL BLUE BOOK

the elevating conveyor and feeds them properly oriented into a centerless grinder, milling machine, induction heater or similar volume production unit.

The feeder is entirely self-contained and has a $\frac{3}{4}$ hp totally enclosed ball bearing motor. An enclosed baffle-box with neoprene-covered plates has been provided to minimize damage to re-

cycled parts. The machine has a variable speed drive and can be adapted to a broad range of high capacity, heavy duty feeding applications.

Other features include loading height of 62", elevating angle of 10° , and overall floor space of 48" x 52".

Feedall, Inc., 38399 Pelton Rd., Willoughby, Ohio.

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SAVE with B & W

New "King Size" Flat Type
(without filter)



SPOTTING & CENTERING DRILLS

and Adapters

No Premium for Left Hand Cut

Made for B&S 2G-1 $\frac{1}{2}$ Screw Machines, these drills are stocked for non-ferrous and steel, both kinds either 90° or 118° included angle points and either right or left hand cut.

All drills for brass, each \$7.90

All drills for steel, each \$8.30

"King Size" is $\frac{1}{4}$ " thick x $1\frac{1}{2}$ " wide x 3" long. When ordering specify for brass or steel, point angles and direction of cut.

B & W PRECISION PRODUCTS CO.

11393 E. Eight Mile Road, P.O. Box 3865
Detroit 5, Michigan, Engineering Dept. B.

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January, 1958

.209

Hitchcock Launches Training Course For Fluid Power Equipment Personnel

A home-study program designed to teach men how to install, operate, and maintain fluid power equipment has been announced by the Hitchcock Publishing Co., Wheaton, Ill.

Two of the nation's leading authorities in the field, Dr. R. C. Binder, professor of mechanical engineering at Purdue University, and Harry L. Stewart, who heads the Special Engineering Dept. at Logansport Machine Co., Inc., Logansport, Ind., have joined forces with Hitchcock to develop the course of study, which is entitled, "Installation, Operation and Maintenance of Fluid Power Equipment."

A discussion-type lesson accompanies each chapter. This is to be completed and returned by the student before receiving the next chapter. Each lesson is graded by a trained instructor. Personal comments help to clarify problems which trouble the pupil.

Upon satisfactory completion of the 18-chapter course, a two-day workshop session is scheduled. The student will

attend a general assembly for one-half day, where a panel of experts from industry will present panel discussions. The remainder of that day and the next will be spent in small groups directed by the panel members. Particular interests, problems, and ideas will be covered at these sessions.

Each chapter of the correspondence course is profusely illustrated. Subjects are divided into bite-size pieces so that something new can be learned in only a few minutes of study. The student sets the pace, studying in his spare time, progressing as fast as he chooses until all 18 chapters are completed.

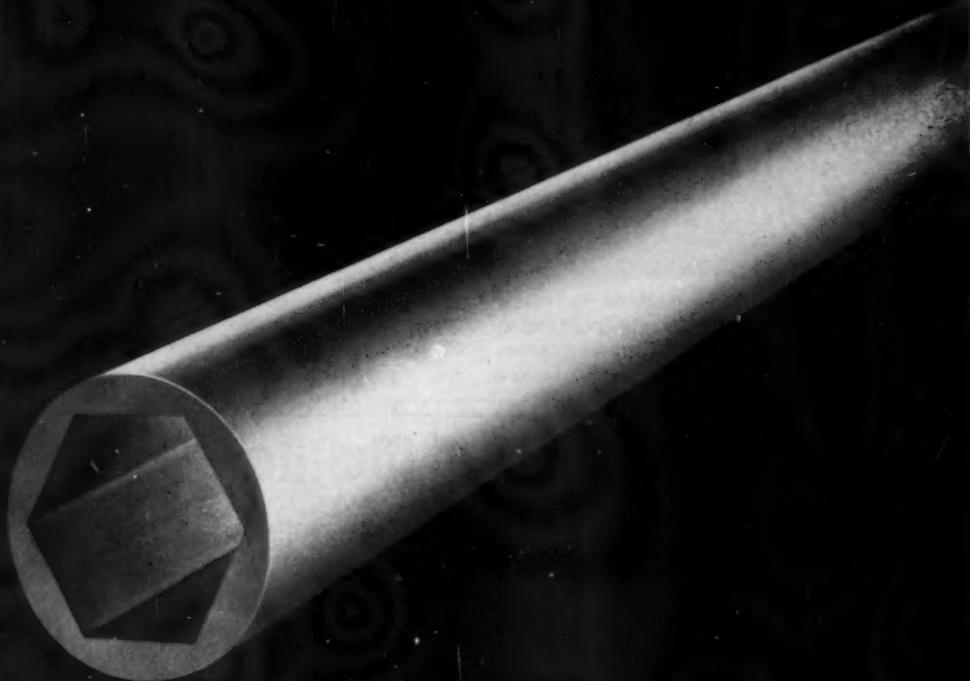
Chapter headings are as follows: (1) An Introduction to Basic Hydraulics and Basic Pneumatic Devices and Systems; (2) Pressure, Work and Power; (3) General Features of Machines and Terminology; (4) Hydraulic and Pneumatic Symbols and How They Are Used in a Circuit; (5) Air Compressors and Accessories; (6) Hydraulic Power Devices; (7) Hydraulic Fluids; (8) Piping; (9) Air Filters, Pressure Regulators and Lubricators; (10) Directional Control Valves—Function and Operation; (11) Flow Controls; (12) Pressure Controls; (13) Cylinders—Non-rotating and Rotating; (14) Pneumatic Motors and Tools; (15) Rotary Hydraulic Motors and Hydraulic Transmissions; (16) Accumulators; (17) Pressure Boosters; (18) Causes of Circuit Failures.

Both new and old employees in the fluid power field may benefit from this program. It provides the organized, practical training the novice must have and serves to upgrade the more experienced worker. Besides foremen, shop mechanics, operators, etc., salesmen may take the course to learn how to better maintain the equipment sold.



Each student receives a loose-leaf simulated leather binder when he enrolls in the course. In this are filed chapters and worksheets as completed.

Use postage paid card. Circle No. 95



EVER TRIED MACHINING A SPECIAL I.D. SHAPE?

— in stainless steel, with each part 22 inches long, the outside diameter a shade over 2 inches and with tolerances of $+.000"$ to $-.010"$ across the flats?

On jobs like this, there's possible trouble ahead if you start with solid stock, or even round heavy wall tubing. Machining problems, surface finishing, scrap loss, special cutting oils or compounds—added to the original stock cost may make the final cost of the part prohibitive.

There is one sure way of minimizing your production problems and costs involving hollow cylindrical parts and products—**DESIGN WITH B&W MECHANICAL TUBING.**

Before you start your next production

run, call Mr. Tubes at your nearby B&W Tubular Products Division District Sales Office—let him match tubing steels, types, finishes, shapes and tolerances to your applications—he will show you how to keep final costs low. Or write for bulletins 361 and 340. The Babcock & Wilcox Company, Tubular Products Division, Beaver Falls, Pa.



TA-4086-M3

Seamless and welded tubular products, seamless welded fittings and forged steel flanges—in carbon, alloy and stainless steels.

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Porous grinding wheel forms air pockets in cutting surface

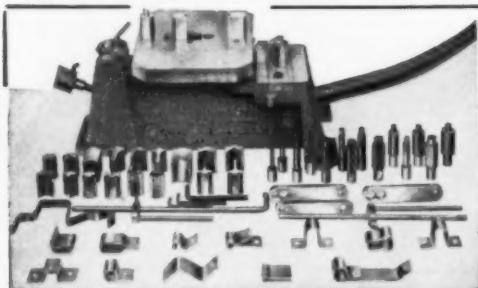
A different kind of porous grinding wheel utilizes minute balloon-like particles or brittle sponge-like rigid materials that break away to form "air conditioned" voids in the cutting surface when the wheel is in use.

This invention is claimed to make possible better control or pore uniformity in denser hot pressed resin bonded snagging wheels. It also makes

possible the manufacture of more porous cool cutting wheels and segments. In this case, the balloon-like particles act as pore supports to prevent slumping during the melting of the resin bond prior to hardening in the bake ovens.

With the new type wheel, a wider range of structures is possible with greater uniformity, says the manufacturer, Electro Refractories & Abrasives Corp., Buffalo, N.Y.

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Multiform BENDER CUTTER CUTS, BENDS, PUNCHES

Available in hand, air and hydraulic models, the MULTIFORM is shipped complete with full assortment of dies and mandrels to punch, bend, and cut round or flat brass, bronze, aluminum, steel, etc., up to $\frac{1}{8}$ "x $1\frac{1}{2}$ " as illustrated, other models up to $\frac{1}{2}$ "x8".

J. A. RICHARDS CO.
KALAMAZOO, MICH.

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GRIND: RADIUS-ANGLE QUICKLY EASILY

RADIUS DRESSER \$44.00



Chatter Resistant, Spring Loaded Spindle

Hardened shaft—bearing adjustable for wear. Diamond always perfectly centered. Easily set adjustable 180° stops.

All surfaces ground true from hole.

CAPACITY— $1\frac{1}{2}$ " Convex to 4" concave.

10" Wheel size for DeALL and NORTON Grinders—\$49.00. Diamond \$8.00.

14", 20" & 24" wheel sizes available.

ANGLE DRESSER \$49.00



Diamond \$8.00
ORDER DIRECT
on our 10 day
money back
guarantee

Ball Thrust Bearing.
24 Precision Ground Surfaces, not just milled & chrome-plated. DIAMOND BLOCK Slides In Ground & Lapped Housing. Can't Chatter. Set Accurately With Protractor or Sine Bar. Largest Bearing Surfaces Of Any Dresser.

The "Mighty Midget" Line

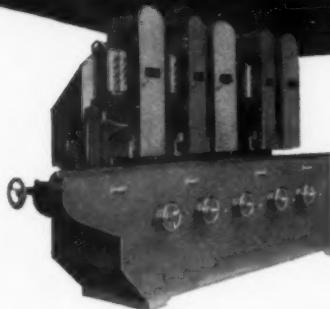
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Double Production

by grouping several operations on one

Engelberg Abrasive-Belt Grinder!



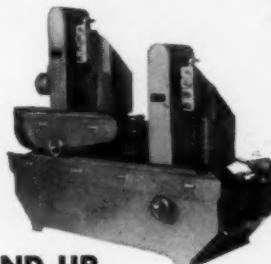
FOR GRINDING BOTH SIDES OF FLAT WORK

Piece-work first passes under grinding head at left, then is carried around bend to bottom conveyor belt. Unground face is now *up*, positioned for passage under second grinding head at right.

MODEL 680-5 MULTIPLE - HEAD GRINDER Available up to 6 Heads

Single-cycle grouping on 5-headed machine above might include: deburring, flat-surfacing, sizing, polishing and fine polishing. Stock removal is at high speeds. Large grinding area, long belt disperses and dissipates heat. Runs wet or dry.

Model
2-1092



PRODUCTION INCREASES OF 100% AND UP

are not uncommon with the high-production semi-automatic abrasive-belt grinders shown here. Fine finishing to close tolerances may be done on *any* ferrous or non-ferrous metal, plastic or other material.

Precision manufacturing of these and scores of other models has provided facilities and experience ideally suited to the solution of

problems in abrasive grinding. Our methods-engineers will gladly go over your drawings or samples of typical production pieces for operational analysis—no cost or obligation. Just write.

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**THE BEST
PORTABLE
ELEVATING TABLE
YOU CAN BUY . . .**
(Eliminates Cranking)



2000 LBS. OR *1000 LBS. CAPACITIES
*ILLUSTRATED

**A precision made
MIDWEST TABLE
Costs no more!**

- ✓ It's hydraulic . . . positions work or feeds at desired height without use of hands
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- ✓ Machined top surface can be used as work table
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Write today . . . specials on request

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TOOL & ENGINEERING CO.

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214



Double-end boring bar

A double-end boring bar encased with Kennametal hard tungsten carbide reduces chatter and cost of precision boring. This tool is being made in a range of sizes for machine shop use. The bar illustrated has a 1 3/4" square cross section and is about 14" long.

Kendex type clamping mechanisms are recessed in each end of the bar to hold the chipbreaker, insert, and seat, all made of Kennametal.

Kennametal, Inc., Latrobe, Pa.

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**SPEEDY-SAFE
NON-POISONOUS
CASE
HARDENING**

Indispensable for Tool Rooms, Machine Shops, Schools, etc. Now available in 1, 5, 10, 25, 50 and 100 lb. containers.

Write for Details
Est. 1912

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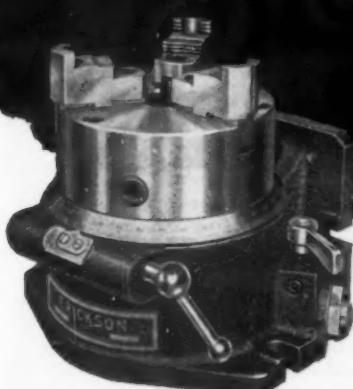
MACHINE and TOOL BLUE BOOK

NEW

ERICKSON MASTER SPACER

with No. 0 Timken Bearings.

gives increased
production and
optimum accuracy in



inspection

milling

jig drilling
with either micrometer
or "Jo" block setting

Write for free catalog
"Erickson Master Spacers"
today. And if you
send now, request
your copy of Catalog K,
you'll find cost-
sleashing applications
for all Erickson
holding tools.



The new Erickson Master Spacer quickly and accurately positions work for a wide variety of jobs. This one tool can eliminate expensive jigs and fixtures . . . makes it a simple procedure to set up drilling, milling, boring and special machining operations.

The new Erickson Master Spacer, ideal for tool room and production machining, assures outstanding performance under heavy helical cuts and slow feeds. Indexing accuracy guaranteed within .001-inch cumulative error on a 6-inch diameter circle. Jig drilling is possible with either micrometer or "Jo" block setting. Timken bearing construction permits work to be trued in position with brake off because spindle alignment remains unchanged.

The new Erickson Master Spacer can help you come to grips with your Number One Problem—high production costs. The first step is to get the Erickson story.

AA-3091

ERICKSON TOOL COMPANY

34361-1 Solon Road • Solon, Ohio

COLLET CHUCKS • FLOATING HOLDERS • TAP CHUCKS • TAP HOLDERS • AIR-OPERATED CHUCKS
EXPANDING MANDRELS • EXPANDING-COLLETS • SPECIAL HOLDING FIXTURES

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January, 1958

215

Nylon drill sleeves

Drill sleeves made of Dupont nylon have now proven to be outstanding in reducing drill breakage, scored spindles and damaged chucks. Because of the nature of this nylon, the sleeve will break under sudden shock and leave the drill intact. Its ability to withstand heavy feeds without distortion or drill slippage equals or exceeds that of metal sleeves. Morse taper O.D.

sizes 1, 2, and 3 with a full range of inside diameter sizes are now available.

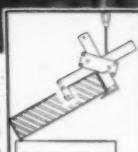
Extensive tests prove that the James straight shank nylon drill saver works equally well with taps, counterbores, deburring tools, end mills, and similar straight shank tools, and are accurate to .002 in concentricity.

James Products Co., Dept. RH, Mentor, O.

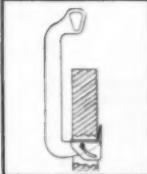
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**MODEL A
COIL GRAB**
Wedge separates coils easily. Lifts and turns in one motion.



**MODEL H
COIL HOOK**
Pivoting shoe supports, turns, and locks coil in position in one motion.



DIXON AUTOMATIC TOOL, INC.
2306-23rd Avenue • Rockford, Illinois



Equipment for Automatic Parts Handling and Assembly

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FREE BULLETIN

Illustrates standard models and shows how to handle all coil sizes safely, rapidly, without damage. Write for it today.

MACHINE and TOOL BLUE BOOK

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Whatever your marking problem may be—whatever the size and shape of the products involved, whether the operation requires a hand-stamping device or a fully automatic machine — has the answer. Write today for information, or for consultation with a thoroughly experienced representative.

**IF IT'S WORTH MAKING,
IT'S WORTH MARKING.**

GEO. T. SCHMIDT, INC.
 1802 W. BELLE PLAINE AVE.
CHICAGO • 13 • ILLINOIS

Heavy duty cutting oil promotes good surface finish

Gulfcut heavy duty soluble oil combines the cooling ability of water with the lubricity and protection of oil. Lower machining costs through longer tool life, heavier cuts, and higher speeds and feeds are claimed. These benefits

apply to all metals, particularly those with low machinability ratings.

Chemically active compounds protect against foaming and welding. Wetting-out properties are high, providing effective cooling. Cutting oil contains a stable petro-chemical emulsifier. Surface finish, as well as rust and corrosion protection, meets quality standards.

In grinding operations, good finishes and minimum wheel loading and breakdown are claimed by the manufacturer. Average mixture is 25 parts water and one part oil.

Applications include: heavy hogging cuts, fast fine cuts, boring and grinding of ferrous and nonferrous metals and alloys, including tough titanium alloys.

Gulf Oil Corp., Gulf Bldg., Pittsburgh, Pa.

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Any Stock BLANCHARD GRINDING

- to 85" diameter and up to 20" x 120"
• 24 Hour Service
• Steel and Aluminum Plate, any size, shape or thickness.
• Weldments.
• Shear blades sharpened up to 10'

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Evergreen 9-2560

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PRECISION BALANCING WAYS

Save Time . . . Cut Cost

Balance rotating parts easier, faster, more accurately with supersensitive Anderson Balancing Ways. No setup, no leveling, no centering. Chilled iron discs, ground and balanced to extreme accuracy, rotate with minimum friction on special bearings. Glass-hard spindles and bearings prevent wear or ball-bearing indentations when balancing heavy weights. Superior accuracy lasts throughout long life. Proved and preferred over 40 years. Write for bulletin 1-5.

Swing	Between Standards	Capacity in lbs.
20 in.	20 in.	1,000
40 in.	30 in.	2,000
60 in.	30 in.	2,000
72 in.	66 in.	5,000
96 in.	88 in.	10,000

ANDERSON BROS. MFG. CO., ROCKFORD, ILLINOIS

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"AUTO - FILL" Multi - Unit LUBRICATORS



FOR PLANTS
HAVING NUMEROUS
AIR TOOLS AND MACHINES,
WILKERSON'S AUTOMATIC "AUTO-FILL"
LUBRICATOR SYSTEM PROVIDES
CONSTANT REFILLING OF OIL, ELIMINATING
MANUAL FILLING.

Many tool maintenance problems are created by empty lubricators. This automatic system will assure a sufficient oil supply in all lubricators at all times with negligible attention, providing big savings in man hours.

All lubricators are supplied with oil from the same supply line, with no limit to the number in use. They do not interfere with the operational air pressure as all units can be operated on different pressures if desired. Simple in design and easy installation—only one moving part.

Any plant can afford this lubricating system because it pays for itself. Installation information on request.

SEE THEM DEMONSTRATED IN THE WILKERSON BOOTH NO. 1147 AT THE PLANT MAINTENANCE SHOW, CHICAGO, JANUARY, 27-30, 1958.

WILKERSON
CORPORATION

Investigate Our Complete Line
of Automatic Air Products.

Write for name and address of our nearest representative and for our Complete Catalog or Specific Information.

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**Pick the drill that's
right for your job!**

General Purpose

ACE

GROUND-FROM-THE-SOLID

DRILLS

Right you are when you specify Ace Ground-from-the-Solid Drills! Chances are you'll find the expanded Ace line includes standard stock drills that are tailor-made for your job. Long ones, short ones. Big ones, small ones. Drills made of top quality, uniformly hardened high speed steel. Carbide tipped and solid carbide drills, too. What's more, you'll find that every Ace drill is *pointed right* for you . . . finished with highly polished flutes and stronger, keener cutting edges that resist wear and breakage, stay on the job longer. So be right, buy right . . . specify "Ace".

Call your local distributor or write direct today for the latest Ace Drill Catalog and current Net Price Schedule.



ACE DRILL

ADRIAN, MICHIGAN

Originators of Ground-from-the-Solid High Speed Steel Drills

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MACHINE and TOOL BLUE BOOK

Bridgeport

offers long-time economy and

wide-range versatility on a moderate investment

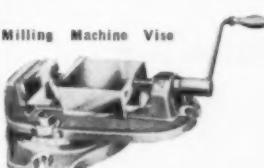
Tool rooms, die shops and production lines are making BRIDGEPORT TURRET MILLING MACHINES a "MUST" today. Economy, speed, accuracy and ease of handling are some of the reasons for the ever-widening acceptance of the BRIDGEPORT, recognized everywhere as the "greatest value in the machine tool market."

To these reasons must be added that of outstanding versatility provided by BRIDGEPORT attachments, a few of which are shown here. Any of these attachments may be purchased at any time . . . with the machine itself or added later when needed.

Thus the basic purpose of the BRIDGEPORT for milling, drilling, boring and shaping may easily be extended to include such operations as cherrying, right angle milling as well as copying.

Precision in manufacture and sturdiness of construction assure economy of the BRIDGEPORT for many years to come. Investigate NOW.

Milling Machine Vise



Improved and providing great gripping power with large diameter screw for rigid holding. Streamlined for appearance and equipped with coolant trough. Two sizes: 5" x 3½" and 6" x 5" jaw openings.



Boring Heads

Made in two sizes. Boring Tools and Holders provide for boring holes up to 6" diameter; available for use on Bridgeport 1 HP Milling. Drilling and Boring Attachment.



Right Angle Attachments

Heavy Duty (shown here) for milling and drilling at right angles fits both Master and 1 HP heads. Also Light Duty for right angle drilling of deep molds and cavities fits Master Head only.



Cherrying Attachment

Makes possible production of convex and concave shapes; ideal for producing drop forge dies, molds, cavities.



True Trace Combination

The Bridgeport True Trace Combination gives excellent performance and saves endless hours when copying irregular dies and molds.

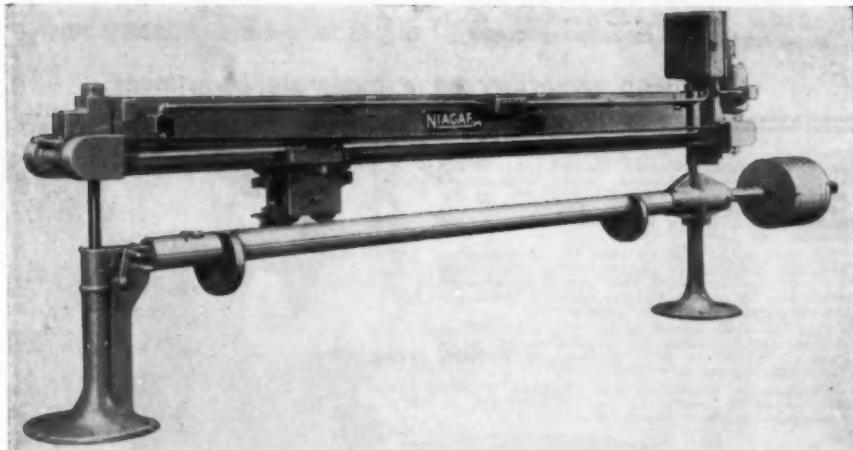
Further facts available through your nearest dealer or through us direct.

Bridgeport MACHINES, INC.

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Manufacturers of High Speed Milling Attachments and Turret Milling Machines

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Pushbutton Controls on Power Groover

Pushbutton controls conveniently located at the center of the grooves

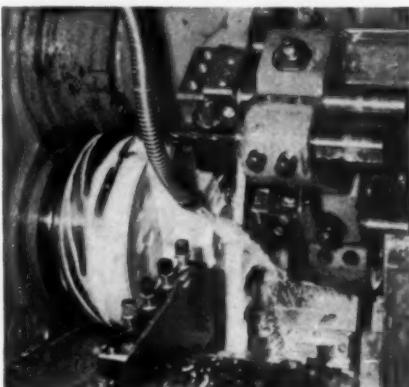
equip them for operating ease and speed.
Power is supplied by a direct-con-

NEW CUTTING OILS FOR TOUGH ALLOYS

Solve your tough alloy production problems with HABCOOL 312XX Emulsifying Oil and HABCOOL 318 Tapping and Cutting Oil Base. Leading aircraft, missile and component manufacturers from coast to coast have found HABCOOL to be the only answer to production machining tough alloys.

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Limited supply of free samples when requested on company letterhead



Manufacturer reports 300% increase in tool life by user when drilling, reaming and contour turning aircraft fittings of AMS 5648 steel with HABCOOL 312XX.

H & B PETROLEUM CO.

191 EAST 25th STREET

PATERSON, N.J.

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nected reversible gearhead motor with built-in brake to stop the carriage quickly for rapid return stroke. A built-in zero speed switch protects the motor and gears from overload by preventing reversal when the carriage is still in motion. Driven by a pair of endless chains, the carriage is returned to starting position automatically by a limit switch which reverses the drive.

With 8 models available for single or Pittsburgh lock seaming, these power grooves can be obtained with working lengths from 4 to 10 feet for handling mild steel up to 16 gage.

Niagara Machine & Tool Works,
Dept. RH, 683 Northland Ave., Buffalo
11, N.Y.

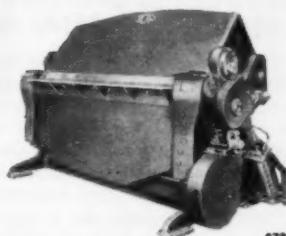
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Bending Steel Plates for WELDMENTS? do it economically with **CHICAGO® BENDING BRAKE**



Many standard sizes are available with capacities for bending mild steel up to 12 feet by $\frac{3}{8}$ inch or 16 feet by $\frac{1}{2}$ inch.

The elimination of die costs and the ease of changing from one job to another make the CHICAGO bending brake the economical method for bending steel plates for weldments. An automatic stop regulating the degree of bend assures duplication on successive pieces.



6780

For details on how to do it, ask for Bulletin P-55



Press Brakes • Straight-Side-Type Presses • Press Brake Dies
Hand and Power Bending Brakes • Special Metal-Forming Machines

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MANUFACTURING CO.
7440 South Loomis Boulevard, Chicago 36, Illinois

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Thin metal parts without dies

Photo-etching is a method for producing thin metal parts without dies or presses. A large, inked drawing of the desired part is photographed onto sheets of sensitized metal up to .016 inch thick. Since the image protects the metal from the action of the etching solution, the parts are readily etched free of the unwanted surrounding metal.

Shapes too intricate for stamping are claimed to be easily made by photo-etching. Very close tolerances—in the



Thin metal parts in shapes too intricate for stamping are produced by photo-etch process.

PAT. PENDING

Satisfaction Guaranteed Or Money Back TRIAL OFFER

TRU-O-SEAL Fittings are guaranteed to seal pipe thread connections permanently against all oils, practically all known chemicals and gases; to seal under high pressures or vacuum; to withstand -280° to plus 500° F.; to eliminate "overtightening" damage and pipe dope. Available in $\frac{1}{8}$ " to $\frac{2}{1}{\frac{1}{2}}$ " pipe thread sizes.

\$10.00 Trial Offer No. 1: eight $\frac{1}{2}$ ", ten $\frac{3}{4}$ ", eight $\frac{5}{8}$ ", ten $\frac{1}{2}$ " pipe thread **TRU-O-SEAL** Fittings.

\$10.00 Trial Offer No. 2: eight $\frac{1}{2}$ ", ten $\frac{3}{4}$ ", four 1" pipe thread **TRU-O-SEAL** Fittings.

Send order to

TRU-O-SEAL DIVISION

Flick-Reedy Corp

2026 N. Hawthorne Melrose Park, Illinois

"Miller Fluid Power" is also a Div. of Flick-Reedy Corp.

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MACHINE and TOOL BLUE BOOK

224

order of plus or minus .002 inch—are readily maintained. No burr is left by the process, a fact which is important in some instrument parts where deburring is impractical and costly.

Modifications in design can be made by simply reworking the original inked drawing and re-photographing.

Photo-etching service is offered by the Randolph Co., 1018 Rosene, Houston, Tex.

Use postpaid card. Circle No. 101

Tool sets divider, compass

A simple precision tool, the Micro-Scale, is used to set dividers, trammels, or compasses to any radius or size within the range of the tool in increments of .001 inch. It may be used by the template maker, tool and die maker, gage maker, layout man, designer.

Accuracy is permanent. Design is trouble-free. Steel parts are electro-lized (75-78 R. superficial hardness) for

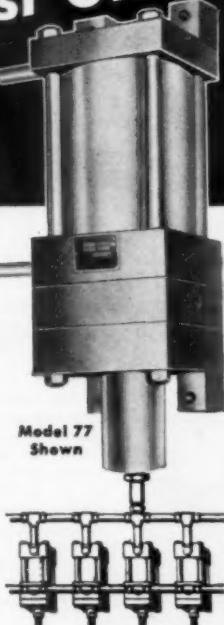
Up To
10,000 psi Oil
from
Shop Air!

Miller AIR TO HYDRAULIC
BOOSTERS

No Pumps or High Pressure Valving Needed

Hook a Miller Air-Hydraulic Booster to your air line and get INTENSIFIED (ratios up to 100 to 1) Hydraulic Power that you can vary and control at will and use for such common shop operations as punching, clamping, pressing, riveting, shearing, welding, crimping, testing, etc. High pressure booster output drives the hydraulic work cylinders and can be directly applied (without cylinders) in testing, measuring, other applications. Boosters save air, space, weight, require little or no maintenance, and hold pressure as long as desired without additional power consumption. Models for immediate delivery.

Model 77 Shown



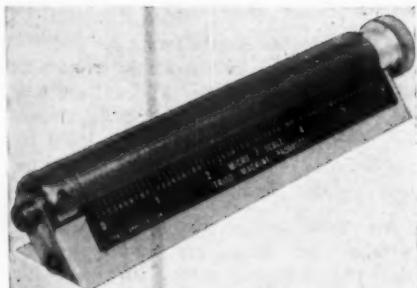
Write For Full Details

Miller FLUID POWER DIVISION
Flick Reedy Corp.
2026 N. Hawthorne • Melrose Park, Ill.

Use postpaid card. Circle No. 366

January, 1958

225



Micro-Scale—for precision layout work.

wear and rustproofing. Scale lengths available: 6", 12", 18", 24".

In application, one point of divider or trammel is set on line "O" of barrel and tangent to line on scale. Knurled knob is then rotated to desired size on graduated dial, tangent to line on scale. Next, second point of divider is set on helical line of barrel at desired size tangent to linear scale.

Trico Machine Products Corp., 2664 Grand Ave., Cleveland.

Use postpaid card. Circle No. 102



You **KNOW** where
the holes will be...with
**UNIVERSAL ADJUSTABLE
U.S. Drill Heads**

"Shot gun accuracy" is for the birds. With U. S. Heads you pin-point your multiple-hole drilling *exactly*—position the drilling spindles for different patterns almost as easily and quickly as you read them from your prints.

Style U-1L Universal Adjustable Head provides 9" diameter drilling area. U. S. Heads cover a wide range—
6" to 15" diameter drilling areas, drill sizes up to 1-1/16".
Totally-sealed, lifetime-lubricated universal joints can be interchanged quickly without tools.



Immediate delivery on most sizes. Write today for complete specification data in new catalog No. AD-57.



UNITED STATES DRILL HEAD CO.

BURNS STREET • CINCINNATI 4, OHIO

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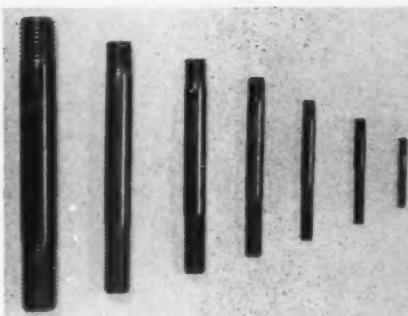
MACHINE and TOOL BLUE BOOK

Studs resist fatigue and wear

Studs made from Stressproof steel are now available from stock in $\frac{1}{4}$ "-1" diameters. They range in lengths from $1\frac{1}{2}$ " to 20".

Stressproof steel of 25 Rockwell C, is reported to be machined or threaded as easily as cold rolled steel. It has a tensile strength of 125,000 psi and a minimum yield strength of 100,000 psi.

Northwestern Tool & Engineering Co., 118 Hollier Ave., Dayton 3, Ohio.
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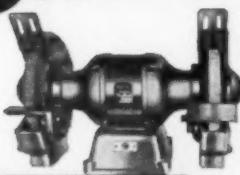


Northwestern studs—claimed to have a long life.

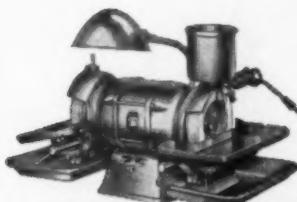
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183-10" Grinder. Every part oversize and ruggedly constructed for hard, continuous use. 1 HP, 1725 RPM. Wheels: 10" x 1" x $\frac{7}{8}$ "—36 and 60 grit. Ideal for grinding large, odd-shaped pieces. \$150.00.



Carbide Tool Grinder. Sharpens quickly, accurately. Reversible $\frac{1}{2}$ HP motor withstands repeated overloads. $1\frac{1}{2}$ " wide wheels \$171.70.

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Dynamically balanced Baldor Grinders provide smoother operation, far greater accuracy. Assure hours of relaxed, fatigue-free operation. Rugged... durable... the first choice of old hands who have tried 'em all.

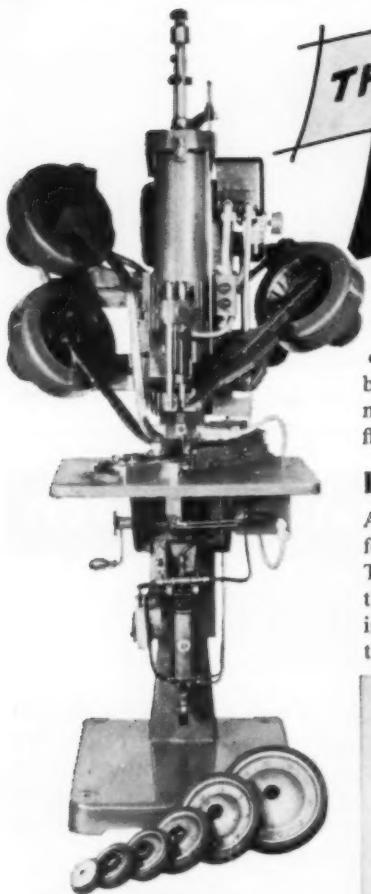
- Lubricated for life ball-bearing motors never need servicing!
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- Models for every need! $\frac{1}{4}$ to 3 HP, 6" to 12" individually balanced wheels. Bench and pedestal types.
- Every model fully guaranteed.

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THIS 4 in 1

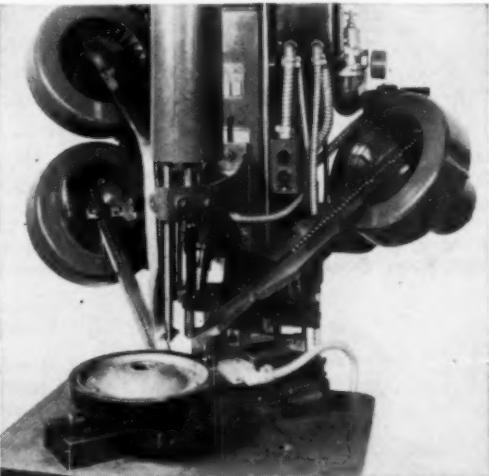
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BOOSTS ASSEMBLY PRODUCTION 300%

- A special assembling machine built on the combination of a Power Screwdriver and three automatic Parts Feeders fastens an inner and outer flange on the rubber tires of

INDUSTRIAL TRUCK WHEELS

A screw, lock washer and nut are automatically fed and oriented, each from a separate parts feeder. The operator simply places the wheel segments in the locating fixture, starts the machine cycle indexing to the proper driving point, at which location the assembly is completed.



The above unit represents but one of a thousand different applications of DPS assembling machines now in successful operation. Let us show you how you can greatly increase your production at a substantial saving by these modern power methods.

Write for Catalog Send Sample Assembly

DETROIT POWER SCREWDRIVER CO.

2809 W. FORT ST.

DETROIT 16, MICH.

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POPE engineers and builds

20,000

**DIFFERENT motorized and Belt Driven
S P I N D L E S**

one of which may be just the one to
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Here are only a few representative Pope Precision Spindles:



FOR SURFACE GRINDING

POPE 1, 2 and 3 HP Totally Enclosed 1800 and 3600 RPM Motorized, Cartridge Type Spindles with double row cylindrical roller bearings of enormous capacity for superior performance and long life, plus separate thrust bearings for no endwise movement of the shaft.



**FOR HEAVY DUTY MILLING
AND GRINDING**

POPE $\frac{1}{2}$ to 100 HP Direct Motorized Spindles operate in any position — flanged or tapered noses — equipped with super-precision, double-row roller bearings and preloaded ball thrust bearings. Top quality performance is assured on skin milling, grinding, boring and other operations as well as milling.

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POPE Super-Precision 1 HP, 3600 RPM Motorized Tool and Cutter Grinder Clearance Angle Swiveling Heads

provide angular adjustment in a vertical plane. They pay for themselves in time saved. Cup wheels can be used for practically all clearance angles.



**FOR BORING ROUND HOLES
WITHIN MILLIONTHS
OF AN INCH**

POPE Heavy Duty Boring Spindles assure smooth, chatter free, continuous high production of accurate parts. Belt driven or motorized, in a wide range of horsepower and speeds.



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POPE Precision Internal Grinding Spindles have the super-precision bearings to withstand both axial and radial loads and to produce better finished ground holes. Their ability to take heavy cuts means increased production. Wheel life is increased, too. For Bryant, Cincinnati, Excello, Heald, Landis and Norton Grinders.

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POPE Super-Precision, High Frequency, Heavy Duty Spindles are available for speeds up to 100,000 RPM. They are unequalled for low cost maintenance, long life, trouble-free operation and rugged ability to cut metal fast.



Send us your specifications and get prompt quotations on the one best Spindle for you out of the 20,000 different Precision Spindles that bear the name "POPE."

No. 116

POPE

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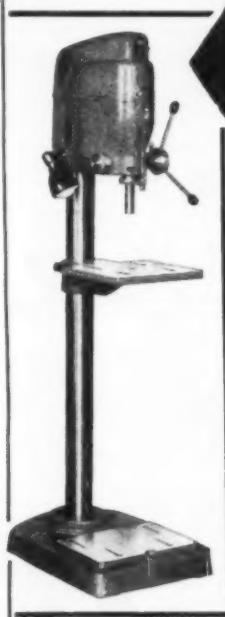
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PRECISION ANTI-FRICTION BEARING SPINDLES
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Free Descriptive Bulletin

The ELECTRO-MECHANIC CO.
263 E. Erie St. Milwaukee 2, Wis.

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230



**Multi-range, multi-purpose
torque wrench**

By using a conventional light weight, small size and low capacity torque wrench, a new series of adapters enables increasing the range of the conventional torque wrench as high as 900 ft.-lb. A number of versatile combinations are available as standard stock items. A normal 150 ft.-lb. capacity torque wrench can be increased for applications as high as 300 ft.-lb. A normal 200 ft.-lb. torque wrench can be increased for capacities as high as 400 ft.-lb. A normal 300 ft.-lb. capacity torque wrench can be increased to 600 or 900 ft.-lb. Because the torque wrenches offered have pivoted handles concentrating the load position they may be used for extremely accurate

FROLI *Rust Preventive* **OIL**

Positive barrier against corrosion that lasts for MONTHS
Protects any metal—even delicate MICRO-finishes
Eliminates fingerprint damage and water spotting.

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MACHINE and TOOL BLUE BOOK

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applications with these new multi-range, multi-purpose adapters.

The torque wrench adapter accessory is a heavy duty, light weight, conventional hand tool that enables using box end openings, ratchet end or a conventional drive square so that sockets can be used. Each of these adapter end accessories may be interchanged and yet maintain the proper lever length of the adapter. A wide range of box end openings are available from $\frac{3}{4}$ " to $2\frac{1}{2}$ ". This multi-purpose, multi-range torque wrench combination is unusually light in weight and well balanced.

P. A. Sturtevant Co., Dept. BB, Addison, Ill.

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"If you should decide to quit, Chip, never mind the two weeks' notice."

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Precision
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THE DANNEMAN COMPANY, Inc.
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CATALOG
ON REQUEST

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January, 1958

PALMGREEN

ROTARY AND INDEXING TABLES AND ANGLE VISES

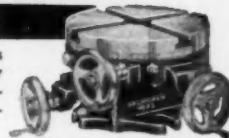
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Everywhere

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Rotary Table. Cross feed slides and rotary Feed. Converts for vertical milling. 8" diameter \$79.95



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No. 96 (not shown),
6" Table diameter, only \$59.95



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Machine Vise.
6" jaw width, a precision vise with swivel base \$99.95
Without base, No. 60 \$89.95
Also 40B. 4" jaw, with swivel base \$79.95
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\$39.95

No. 24B ANGLE VISE

4" jaw
Solve difficult Angle jobs on the production line—quick, accurate setups at any angle for such operations as drilling, milling, grinding. Also other jaw sizes: $1\frac{1}{2}$ ", $2\frac{1}{2}$ ", 3", 4", 6", and 8".

Ask for new catalog No. 205 for complete line, details and prices.

CHICAGO TOOL & ENGINEERING CO.

8384 South Chicago Ave. Chicago 17, Illinois

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What is your LUBRICATING PROBLEM?



- LATHE CENTER LUBRICATION
SCORING-GALLING
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LUBRICANT WASHOUT
- DRAWING
SCORE MARKS-DIE WEAR
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WORK PIECE DAMAGE
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- DIE POSTS
WEAR-FREEZING

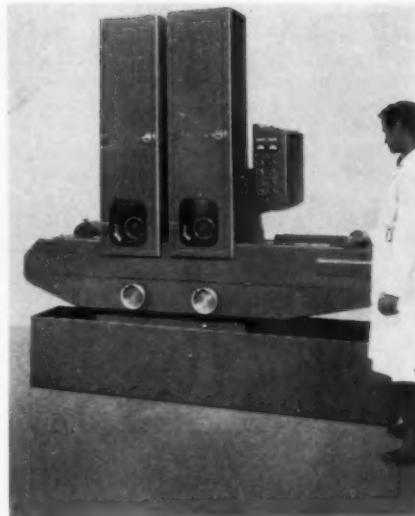


CMD Lube has solved many like it with excellent results. Perhaps CMD will be your answer, too!

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CHICAGO MANUFACTURING
AND DISTRIBUTING CO.

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Flat finisher

The Hammond Model FF-6 flat finisher is built for wet abrasive belt grinding, polishing and deburring of flat work such as sheets, strips, bars, stampings and plates, up to 6" wide by 6" high.

Heavy duty construction throughout and an endless conveyor belt with variable speed control makes this finisher an ideal machine for high volume, continuous production, according to the

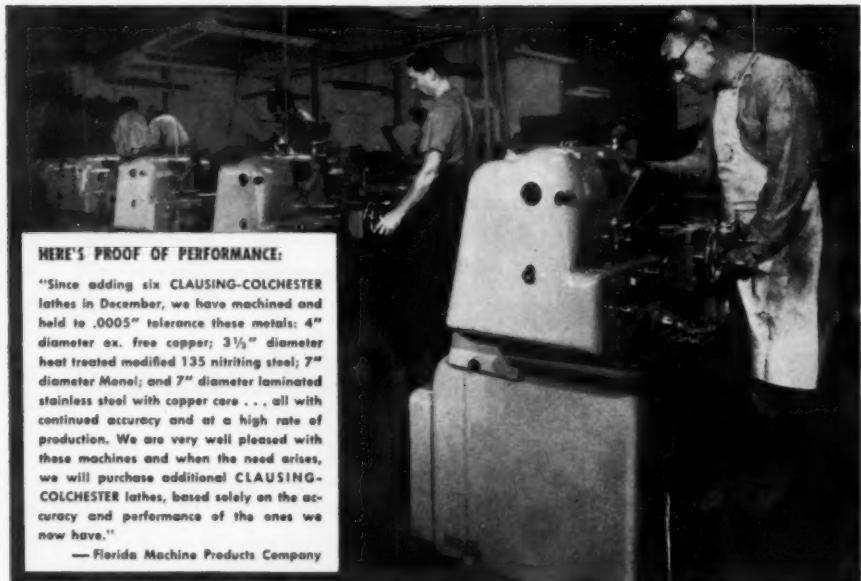
READ TEMPERATURES
FAST

ACCURATELY
with PYRO
OPTICAL PYROMETERS

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Bergenfield 3, New Jersey

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MACHINE and TOOL BLUE BOOK



HERE'S PROOF OF PERFORMANCE:

"Since adding six CLAUSING-COLCHESTER lathes in December, we have machined and held to .0005" tolerance these metals: 4" diameter ex. free copper; 3½" diameter heat treated modified 135 nitrating steel; 7" diameter Monel; and 7" diameter laminated stainless steel with copper core . . . all with continued accuracy and at a high rate of production. We are very well pleased with these machines and when the need arises, we will purchase additional CLAUSING-COLCHESTER lathes, based solely on the accuracy and performance of the ones we now have."

— Florida Machine Products Company

Performance records PROVE **CLAUSING LATHES'** Superior Construction... Greater Value

The statement of Florida Machine Products Company above is typical — users everywhere report Clausing geared-head lathes lead their field in capacity, performance and value. Here's why:

They're bigger in capacity than other lathes in their class. Larger spindles, larger thru-hole capacity, larger bearings for heavier work. 17" lathe spindle, for example, has $3\frac{1}{8}$ " thru hole — 15" lathe, $2\frac{1}{16}$ " hole — 13", $1\frac{9}{16}$ " hole.

Have heavy-duty construction throughout. Bed ways are induction hardened. Gears in head and quick-change box run in bath of oil. Power feeds are taken from separate feed rod, lead screw is used for thread cutting only. Spindles are steel forgings.

Built for precision performance—to American standards of toolroom lathe accuracy. Have Gamet Micron tapered roller bearings with oil flow lubrication — the most advanced and accurate bearings known to industry.

Each is an outstanding value. 13" cabinet base models, including motor and controls, start at \$2113; 15" cabinet base at \$2988; 17" at \$4715. You owe it to yourself to investigate before investing in *any* lathe.

Lathe Capacities: 17" lathe: 54" and 78" centers, 28" swing in gap; 15" lathe: 30" and 48" centers, 24" swing in gap; 13" lathe: 24" and 36" centers, 18" swing in gap.

Write for Free Literature

CLAUSING DIVISION ATLAS PRESS COMPANY

1-107 N. PITCHER ST.

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KALAMAZOO, MICHIGAN

January, 1958

233

manufacturer. It is available with a single head, or, if several operations are necessary, also as a multiple head machine. The abrasive belts are carried by two rolls: a powered contact roll and a tracking idler. Vertical adjustment is manually controlled and tensioning on the idler roll is maintained by adjustable air pressure. Head motors up to 7½ hp are available.

An electro-magnetic platen is used

to hold material on the conveyor belt for positive drive under the contact roll. The magnetic force is variable to suit the size or mass of the work. Spray, mist, fog, and splash are trapped by the metal enclosures around each head to insure a clean, dry work area.

Hammond Machinery Bldrs., Dept. BJ, 1614 Douglas Ave., Kalamazoo, Mich.

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FIRST for secondary finishing...



SCHAUER SPEED LATHES

*Filing cast iron flange with
variable speed type VA3CCA
Schauer Speed Lathe.*

Schauer Speed Lathes provide the most economical method for performing secondary finishing work on metal and plastic parts. Do filing, trimming, deburring, lapping, polishing, etc., faster, at lower costs on Schauer Speed Lathes. Many sizes and models with holding devices to suit the job. *Speed your production* with Schauer Speed Lathes. Write for Catalog No. 530.

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AMES

*...the preferred
Dial Indicators...*



have hardened and burnished pivots for higher sensitivity . . . lower friction

Because metal pivots are stronger than jeweled pivots, Ames has devised a way of hardening and burnishing them to match the sensitivity of jeweled types. The result is a dial indicator that is unsurpassed for accuracy and strength. And it costs less than jeweled types. This "functional" approach is just one more reason why Ames Dial Indicators are so often specified as "preferred". Write today for complete information.

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MANUFACTURERS OF MICROMETER DIAL GAUGES • MICROMETER DIAL INDICATORS

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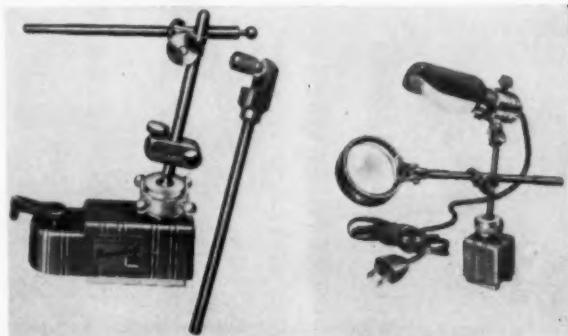
January, 1958

235

Magnetic Base Tool Available in Two Sizes

The Magnicator Junior, a magnetic base tool, comes in two base sizes, with a variety of accessory dial indicators, lights, and magnifiers to meet multiple inspection and setup needs. The blue plastic permanent magnetic bases can be turned on and off with a flick of a fast-action cam release, and are provided with "keepers" to preserve their magnetic strength, which reaches 125 lb. holding power in the larger model.

The small size, designed specifically for use in places inaccessible for larger



Brown & Sharpe Magnicator Junior can be provided with a variety of lights, magnifiers, dial indicators.

indicators, can be mounted instantly and firmly on surfaces as small as $\frac{3}{4}$ " in diameter. Combinations include 3-diameter dial holding rod, a swivel

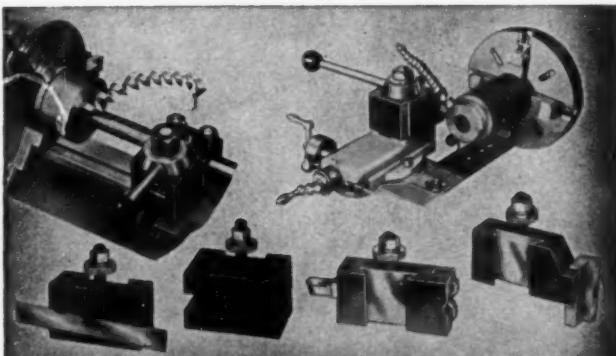
**NOW! LATHE USERS
CHANGE TOOLS
in a ... FLASH ..**

ALORIS
QUICK CHANGE
TOOL POSTS & HOLDERS
Speed Your Operation . . . Save You Money

Only a second to change tools for turning, facing, drilling, boring, threading, knurling, cutting off or any other operation.

- GREAT REPETITIVE ACCURACY.
- RUGGED CONSTRUCTION.
- TESTED AND RECOMMENDED BY LEADING LATHE MANUFACTURERS
- GREATER RIGIDITY.
- SAVES 90% IN SET-UP TIME.
- UNCONDITIONALLY GUARANTEED.

Write for catalog and price list.



ALORIS TOOL CO., INC.

419 GETTY AVENUE
CLIFTON, NEW JERSEY

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adapter for universal angular positioning, and a fine adjustment screw for zeroing indicators.

Spherically milled ball seats are positive locking, and the non-magnetic tool post is brazed to the magnet assembly, assuring rigidity and insulating dial indicators from the base magnet.

Brown & Sharpe Mfg. Co., Providence, R.I.

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Ceramic cutting tool improved

A new ceramic cutting tool, seven times better than its predecessor, is of a newly developed aluminum oxide composition. In laboratory controlled tests and limited field tests, the new ceramic tool outlasted and outperformed its forerunner.

In one production operation, 13" di-



STYLE AND SIZES FOR ALL MACHINES ON WHICH THREADS ARE CUT

On Brown and Sharpe, and other automatics

INSERT CHASERS SAVE UP TO 33%

Insert chasers are like safety razor blades: they cost so little that you can throw them away when dull. Or, for utmost economy, you can resharpen them over and over again. Only a flash grind is required. For less than \$50 you get a dozen sets or 3/4—16 insert chasers, each set ground ready to go. You will be amazed at the quantity of threads they will cut, even to Class 3 specifications, with a minimum of downtime. FREE: "Unified and American Screw Thread Digest."

THE EASTERN MACHINE SCREW CORPORATION
25-45 BARCLAY STREET

NEW HAVEN, CONN.

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ameter steel mill rolls of chilled cast iron were to be remachined. Hardness of the roll was Rc60. Because of the large diameter of the roll, the machining speed could not be reduced below 45 feet per minute on the lathe to be used.

The new ceramic tool made the first pass at 66 fpm, or about three times normal turning time. The depth of cut

was .060" and the feed, .008" per revolution. The tool ran two hours and five minutes. The taper in the 15" length of the roll was only .001" and the surface shown as though polished.

A second test was on interrupted cuts. It involved turning Meehanite rolls 13" in diameter and 52" long. Previous tools were used at a speed of about 100 fpm. In this roll, there were eight $\frac{3}{8}$ " di-

how to trap dust

*that damages
your machines
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Easy-to-move

TORIT

dust collectors trap dust
at its source!



Untrapped dust costs money: "secretly" forces precision machines out of line, limits production. Torit dust collectors are utilized for custom installation—save more money, usually more efficient than central (built-into-building) system. Torit unit operates only when machine or combination of machines it protects are on. Filtered air may be returned to room to save heat. Many models and sizes, all self-contained, easy to move. Write today to . . .

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MACHINE AND TOOL BLUE BOOK

iameter bolt holes which presented the interrupted cut.

The first test run with the ceramic tool was made at 890 fpm. This was subsequently stepped up to 2200 fpm without exceeding the tolerance for taper at any speed. The best surface finish was obtained at about 1600 fpm. Above that, the chips became so hot they had a tendency to weld to the roll, ruining the finish. The bolt holes did not damage the tool. The use of the new ceramic tool in this case reduced turning time from five and a half hours to 30 minutes.

Under certain conditions, the average amount of metal removed by the new ceramic tool (in square inches) for seven runs was 3600. One of the commercially available Norton tools which had been the best previously made by the company removed less than 500 square inches.

Norton Company cautions that ce-

ramic tools are not the answer to every turning need. They should be considered a supplement to, rather than a replacement for, conventional tools. Machine work involving considerable shock on the tool bit is still not practical with ceramic tooling. The application of ceramic tools in the shop will require good tool engineering. It will be necessary to provide protection for the operators from hot flying chips. It will require heavy, more rugged machine tools with higher powered driving motors.

Ceramic tools, however, have already taken their place as standard practice in many areas of machining. They are a logical choice for machining graphite and other abrasive materials. Their greater wear resistance means better size control on long workpieces.

New Products Dept., Norton Company, Worcester 6, Mass.

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INCREASE PRODUCTION . . .



Above is shown a 6M Fen Automatic Wrench operating a 28" heavy duty chuck.

For detailed information regarding the application of the Fen Automatic Wrench to your machines, phone, wire or write.

ELIMINATE "WRENCH WRESTLING"

You can put the advantages of the Fen Automatic Wrenches to your work right in your own shop on machines already in operation, or specify them on your new standard or automatic machines.

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MACHINE COMPANY
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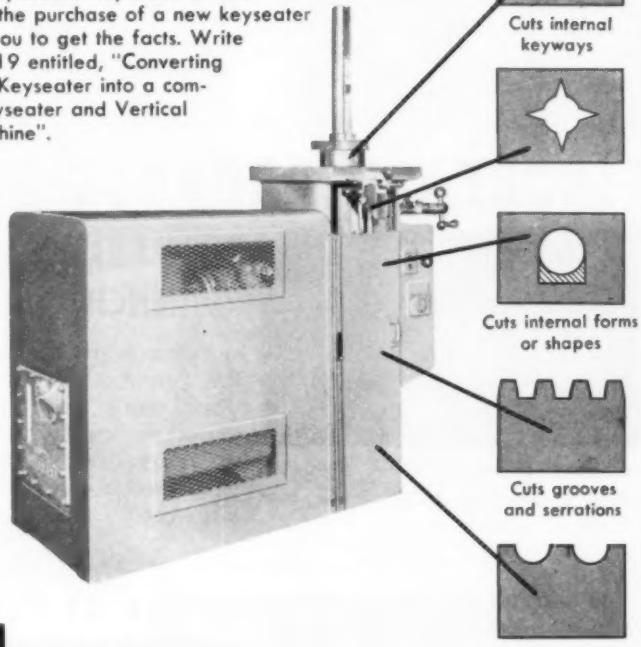
TRIPLE THE USEFULNESS

OF YOUR M&M

KEYSEATER AND VERTICAL CUTTING MACHINE

Simple modification greatly increases productive capacity of this versatile machine.

An M & M Hydraulic Keyseater is not only a keyseater that cuts internal keyways up to 5" wide but a vertical cutting machine as well. Serrations, grooves, teeth—a wide variety of cuts can be rapidly made on this machine with only one simple modification — a work-holding table. This table is now available at moderate cost. If you now own an M & M Hydraulic Keyseater or are considering the purchase of a new keyseater it will pay you to get the facts. Write for Bulletin 19 entitled, "Converting the M & M Keyseater into a combination Keyseater and Vertical Cutting Machine".



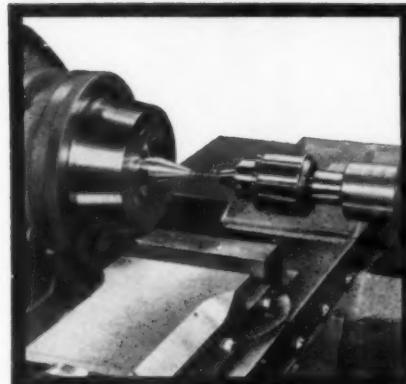
M&M KEYSEATERS AND VERTICAL CUTTING MACHINES

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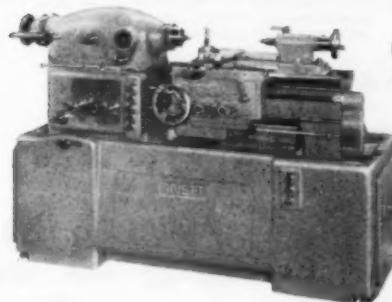
Rivett's 2 for 1 Lathe!



POWERFUL...

As An Engine Lathe

Full horsepower transmitted to spindle. Takes $\frac{1}{4}$ " chip with .020" feed on cold rolled steel.

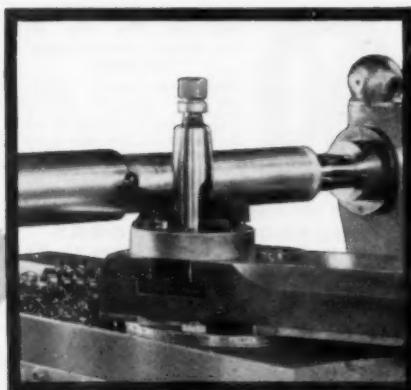


Go to Rivett now for information about this big, beautiful machine. Send for bulletin 1020B.



Sensitive...
As An Instrument Lathe

Responds to the lightest touch of the operator. Turns within .0004" in 12" length!



**Model 1020S "Steelway"
PRECISION TOOLROOM LATHE**

This lathe has long been recognized as the top tool by master mechanics. Now, its adaptability and usefulness highlight its productivity. As one satisfied user states, "Our toolmakers go to a Rivett first in preference to our other lathes!"

RIVETT LATHE & GRINDER, INC.
Dept. MTR-1 Brighton 35, Boston, Mass.

RIVETT

"Steelway" Lathes

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Automatic feeder-driver for standard screws

This machine will automatically feed and drive standard socket set screws at rates up to 1800 per hour. It handles standard, unmodified socket set screws in either hex or multiple spline socket types, and with any of the standard points. Screws in diameters down to No. 2 wire size and up to $\frac{5}{8}$ " diameter can be driven, with lengths down to



Bristol machine feeds, drives 1800 screws per hr.



GEARS

In Stock—Immediate Delivery

Gears, speed reducers, sprockets, thrust bearings, flexible couplings, pulleys, etc. A complete line is carried in our Chicago stock. Can also quote on special gears of any kind. Send in your blueprints and inquiries.

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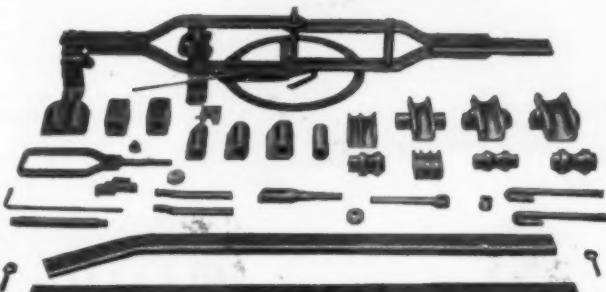
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and shorter than the diameter ("square" screws).

The feeder unit is adapted to a modified Detroit power screwdriver and uses a mechanical rotating type hopper powered by a $\frac{1}{2}$ hp motor. This feeds screws at random into an escapement or tube which enters a selector unit, the heart of the orientation system of the machine. After the selector receives the screw, it indexes about 30° , to a point directly above a feed tube which

goes directly to the driver bit. A metal probe "feels" for the end of the screw, to determine which end is up. If the probe strikes solid metal, indicating the point end, the selector rotates 180° , and the screw is dropped into the feed tube. If, however, the probe detects the hollow socket, the screw is dropped directly without further positioning. The selector then returns to its original position to receive the next screw.

The selector is capable of faster op-

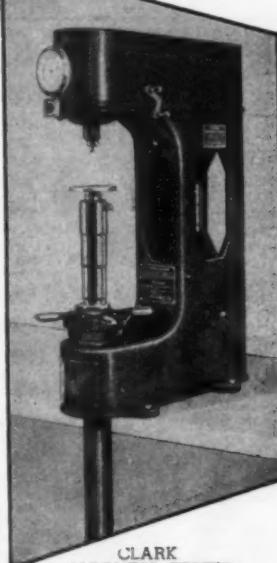


The Clark Hardness Tester is precision built to give guaranteed precision results. Thousands of Clarks, with years of service all over the world, attest to this.

The surprisingly low price includes the precision Clark Diamond Cone Penetrator, as well as Steel Ball Penetrators, a wide assortment of Anvils, Test Blocks, and other accessories. Available in two models, for Standard and Superficial "Rockwell" hardness testing, each with choice of 4", 8", 12", or 16" work capacity.

Before you invest in any hardness tester, get the facts about the low price, speedy delivery, and *guaranteed accuracy* of the Clark. Write today.

THE MOST FOR YOUR
"ROCKWELL TESTING"
DOLLAR!



CLARK
HARDNESS TESTER

CLARK INSTRUMENT, INC.

Use postpaid card. Circle No. 388

10206 FORD ROAD
DEARBORN, MICH., U.S.A.

eration than screws can be driven, so the limiting factor in its use is the rate of presentation of the parts or sub-assemblies to the machine and the rate of driving the screw. With typical screws in sizes such as No. 10 x $\frac{1}{4}$ or $\frac{1}{4}$ " x 5/16", the average rate for feeding and inserting the screws flush in a tapped hole is 1800 per hour.

Typical applications for the machine will lie in assembly and sub-assembly

operations where a ring or knob is fastened to a shaft, such as in radio or automotive manufacture, or in pulleys, sheaves, gears, locking rings.

Socket Screw Div., The Bristol Co., Waterbury, Conn.

Use postpaid card. Circle No. 108

Surface grinder

The 160 square inches of table working surface on the 10 x 16" cap. surface grinder makes this the largest surface grinder in the low price field. The spindle is a direct motor drive mounted on super precision pre-loaded ball bearings, completely sealed and lubricated for life. One horsepower, 1750 r.p.m. motor is included with push button starter. Motor and spindle is precision balanced. Grinding wheel is 12" diameter.

With one revolution of hand wheel, table is traveled a full six inches. The table rides on one vee and one flat



Efficient M-3 High Speed Steel
Clark HOLE-PRODUCING TOOLS
 for production jobs on STAINLESS & ALLOY STEELS!

CLARK HOLE MILL—Makes exact diameter holes fast! One pass in thick stock. Easy starts, curved or irregular surfaces. 1" to 4" sizes; others special.

CLARK ADJUSTABLE SPOT-FACER AND COUNTERBORE—One tool makes many diameters. Easily reground and reset. Heavy cuts in mills, drills, radials, turrets. 3" to 4" sizes; others special.

Write for information on all Clark HOLE-PRODUCING TOOLS!

Robert N. Clark Company
 9330 Santa Monica Blvd., Beverly Hills, Calif.

Use postpaid card. Circle No. 389

THE FORM-ALL

UNIVERSAL ANGLE-TANGENT-TO-RADIUS WHEELDRESSER FOR SURFACE AND CYLINDRICAL GRINDERS

SEE WHAT THE FORM-ALL HAS THAT OTHERS DON'T

Features

	Form- All	Geo- metric Geo- metric Dresser metric of "A"	Geo- metric Dresser metric of "B"
1. Automatic self-centering	YES	YES	NO
2. Selective centering	YES	NO	YES
3. 2 angles tangent to radius, dressing automatically	YES	YES	NO
4. Micrometer setting of diamond	YES	YES	NO
5. Straight line angle dressing	YES	NO	YES
6. Spring-loaded gib for angular dressing	YES	NO	NO
7. Chatter-free even on hard wheels	YES	NO	NO
8. Angular motion is straight with no looseness in gibs	YES	NO	YES
9. Vernier for angular settings	YES	YES	YES
10. 1 minute micrometer adjustment for angular settings	YES	NO	NO
11. 3° straight line angle dressing without stopping at center	YES	NO	YES
12. Position dresser against any one of the 4 sides to dress 180° radii	YES	NO	NO

Prices: \$590
 including diamond
 and instrument case
 F.O.B. East Orange, N.J.



FORM-ALL MANUFACTURING COMPANY

*Providing "The Engineering Service
 for ALL Form Grinding"*

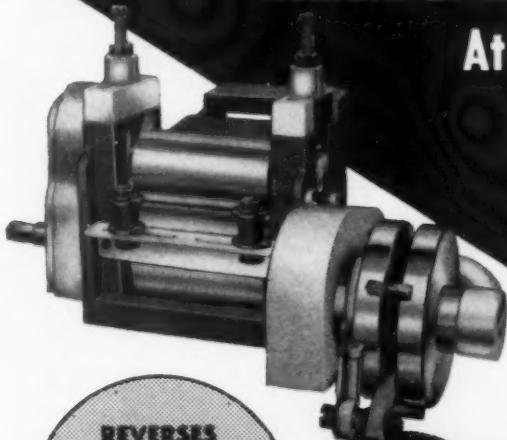
364 Glenwood Ave. East Orange 2, New Jersey

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"RFC" AUTOMATIC ROLL FEEDS*

Remain at Constant Settings

At Speeds Up To
450 Strokes
Per Minute



REVERSES
INSTANTLY . . .
shift feed finger
spring from one
lug hook to
opposite side.

PATENTED
CLUTCH MECH-
ANISM . . . with
fewer working
parts for less
maintenance

CAN'T SLIP
. . . each wedge has
four points of
contact to safe-
guard accuracy

NO RATCHETS
OR PAWLS . . . to
wear down and
throw off feed
spacing.

*Patented

"RFC" Automatic Feeds are available for bench and pedestal-type high speed power presses. Even without pilots or finger stops, "RFC" Automatic Feeds control feeding to utmost accuracy assuring perfect blanking and no waste of stock.

Write For Catalog And Prices

MANUFACTURERS OF QUALITY FEEDS FOR POWER PRESSES



Roll Feeds Corp.
ASHTON, R. I.

Use postpaid card. Circle No. 391

January, 1958

245

FOR SALE

Lasting SURFACE ACCURACY

any accuracy up to 40 millionths
any size or shape you need

Herman Balanced Granite with registered accuracy means you get a surface plate over which tools glide smoothly. All areas of Herman plates are above datum line and within specified accuracy for higher precision with longer useful life.

Write today
and state your
requirements



HERMAN SURFACE PLATE

Balanced Granite  Registered Accuracy

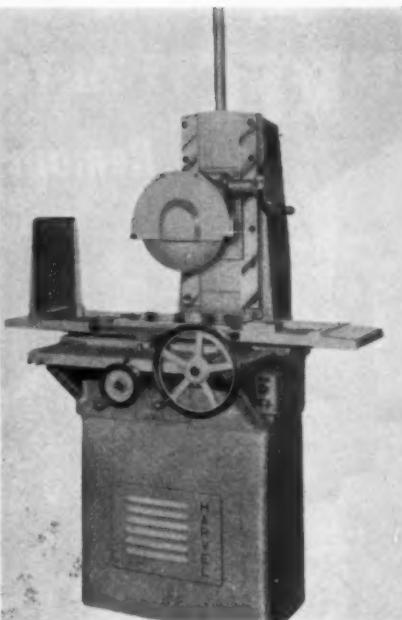
PLATE

NUMBER

THE HERMAN ▲ STONE COMPANY
First in Granite Surface Plates •
DAYTON 7, OHIO

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246



way. All feeds are by hand. All hand wheels are chrome plated. All shafts are ground and mounted on ball bearings and lubricated for life. Other features include telescoping dust guards, hard chrome vertical front ways and adjustable table stops.

Harvel Co., Dept KE, 5135 Coffman-Pico Road, Pico, Calif.

Use postpaid card. Circle No. 109

Mold your own LEAD HAMMERS

Here's the inexpensive, fast way of molding and remolding your own lead hammers with this COOK mold and ladle. It produces hammers that can "take it". Simple to operate.

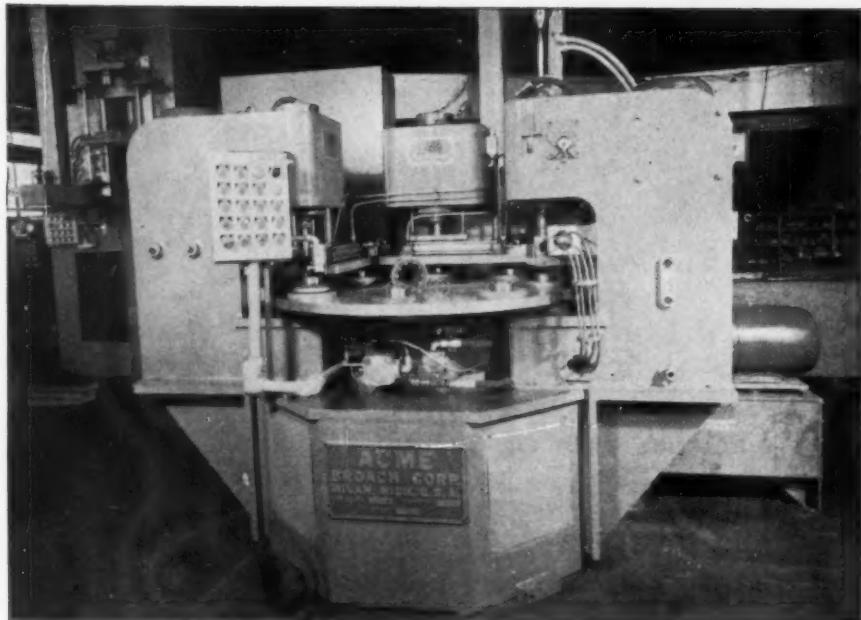


*Write
for circular
and prices*

LAWRENCE H. COOK, INC.
67 MASSASOIT AVENUE, EAST PROVIDENCE 14, R. I.

Use postpaid card. Circle No. 393

MACHINE and TOOL BLUE BOOK



Acme Automated Assembly incorporating standard press units

Shown above is a special unit utilizing three standard type Acme Hydraulic Bench Presses, a special base unit and large diameter eight-station rotary hydraulic index table recently supplied a foremost automobile manufacturer. This unit was designed and built by Acme for pressing formed bushings into automatic transmission components and then pressing a

burnishing ball through the complete assembly in order to size the ID of the bushings and assure required finish. Bushings are magazine fed and operator merely places the major component into fixture bushing and removes completed assembly. Unit produces at the rate of 300 completed parts per hour.

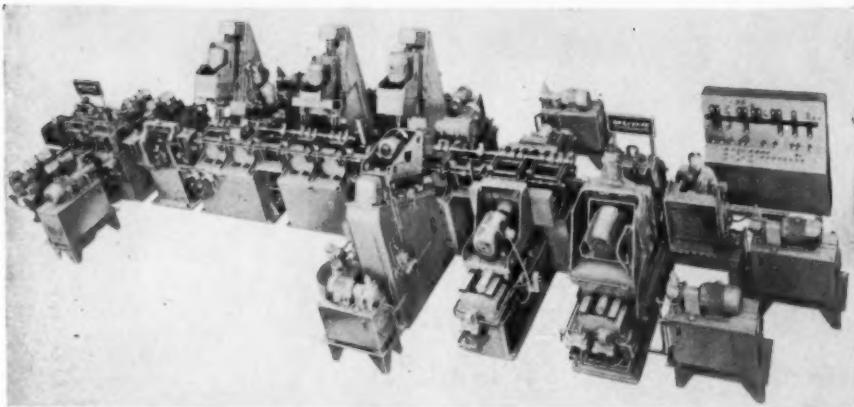
Contact Acme today for help on your broaching, broach tooling and press problems. No obligation.

A C M E B R O A C H C O R P.
—MILAN, MICHIGAN—

Use postpaid card. Circle No. 394

January, 1958

247



Mills, machines both right- and left-hand manifolds

Big feature of this 20-station Buhr Economatic is that it completely mills and machines both right-hand and left-hand exhaust manifolds in one machine.

Another noteworthy feature is its

swift bi-part accommodation, the facility of quick change-over from right-hand to left-hand parts (or vice versa) which is accomplished by gyrating spindle-heads.

**WALLS TU-WAY
BELT SANDER**

Full 1/3 h.p.
6. E. Motor

USE IT
EITHER WAY

HORIZONTAL

VERTICAL

At last, a top quality industrial sander that provides all the most wanted features - yet sells for so little. **\$89.95**

complete with cord, plug, switch ready to use

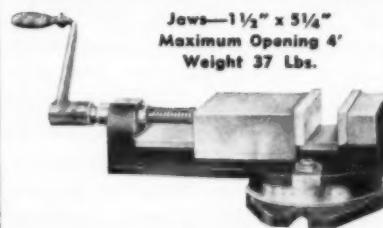
Illustrated Literature on Request

A few desirable distributor territories still available

WALLS SALES CORPORATION
333 Nassau Avenue Brooklyn 22, N. Y.

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NEW BRITAIN SWIVEL VISE



The body is made of semi-steel; the jaws of tool steel hardened and ground. All working surfaces are ground. The vise is as accurate as is possible and the degrees are cut to very close limits.

Write for further information

NEW BRITAIN TOOL & MFG. CO.

13 HARVARD STREET
NEW BRITAIN, CONN., U.S.A.

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MACHINE and TOOL BLUE BOOK

Production rate is such that this Economic processes a complete part every 25 seconds, or 144 pieces per hour at 100% efficiency. Process includes the following 41 operations—(15) drill, (8) spotface, (5) mill, (5) countersink, (4) tap, (2) ream, (1) counterbore and (1) probe.

Buhr Machine Tool Co., Dept. BJ,
839 Greene St., Ann Arbor, Mich.

Use postpaid card. Circle No. 110

Swedish grinders

Made in Sweden and marketed in this country by Homestrand, Inc., Larchmont, N.Y., MALCUS drill point grinders are simple and inexpensive machines capable of grinding drill points with high accuracy, correct clearance angle and identical cutting edges. The grinding can be performed by inexperienced personnel.

Use postpaid card. Circle No. 111

Johnson

Speaks for itself in
ANY SHOP!



Model J (Heavy-Duty) (Wet or Dry Models)

Johnson Model "J" . . . the heavy duty band saw that speaks for itself. No other saw handles so many operations so easily and so economically. Why pay more when a Johnson Model "J" can cut the 10' rounds, 18' flats and odd shaped steels of your shop in such labor saving time. The Big "J" is completely automatic—and is available in a wet or dry model, both with variable speed and centralized control system. You can't afford to miss any information on the rugged Johnson Model "J". Contact your dealer today!

Johnson MANUFACTURING CORPORATION
1012 Barnes Street • Albion, Michigan

Eastern Distributor
R. J. R. KELLY CO.
Hale Bldg., 51 Main St.
East Orange, N. J.

Midwestern Distributor
W. Q. LUNDMARK
75 N. Broadway
Des Plaines, Ill.

Western Distributor
HASTINGS DISTRIBUTORS
1605 Solano Avenue
Berkeley, Calif.

Use postpaid card. Circle No. 397



Distance back from center of slide $1\frac{1}{4}$ ". Width of opening in back $1\frac{1}{2}$ ". Stroke of slide $\frac{3}{4}$ ". Adjustment $1\frac{1}{2}$ ". Maximum die space $2\frac{1}{2}$ " as shown. Can be increased by blocking up between base and bottom of Press. Rated at one ton capacity. Height overall $13\frac{1}{2}$ ". Weight 46 lbs.

Some Desirable Dealer Territory Open

UNION TOOL & DIE CO.
299 Norton St. Rochester 21, N.Y.

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YOST AIR POWER VISE

does away with special and costly jig fixtures!



4-D Vise—DRILL PRESS
Air Operated

Yost air operated vises speed production and eliminate wasted time for manual clamping in drilling, milling and shaping operations. Replaceable steel jaws can be pre-set to any desired opening. A complete control kit is included with each unit. For whatever type of vise you need . . .

YOST MFG. CO.

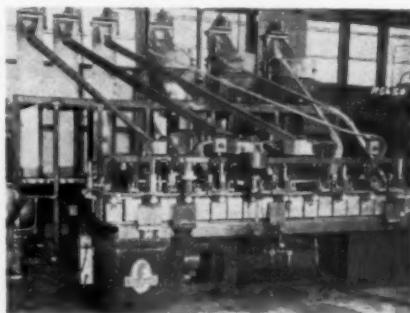
124 Grant St.
Cambridge Springs, Penna., U.S.A.

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Machine assembles roller skate wheels

Roller skate wheels with nine parts and twenty bearing balls are assembled automatically on a fifteen station straight line machine. Production rate is thirty a minute with one observer-operator.

The basic transfer machine is a standard Ferguson Trans-O-Mator eleven feet long with twenty-six carriers and a 12" stroke. All parts except the bearing balls and a dust shield are elevated from storage bins by magnetic con-



veyors to vibratory feeders mounted on the conveyor supporting structure or on the machine. Balls are fed, ten at a time, from hoppers at two stations. After insertion in the assembly, the balls are semi-free during transfer to the next station. However, a roller gear drive indexing mechanism with a modified trapezoid acceleration characteristic accomplishes smooth carrier movement without dislocating the bearing balls.

An electrical interlock system, working through a standard control panel, turns the machine off automatically in the event an out-of-tolerance part causes a jam, thus preventing damage to tooling.

Ferguson Machine Corp. of Indiana, Dept. BB, 7818 Maplewood Industrial Court, St. Louis 17, Mo.

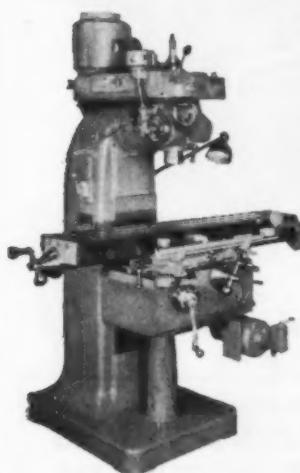
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Produce MORE...

Produce it BETTER!

**ON THESE IMPROVED ECONOMICAL
INDEX VERTICAL MILLS**

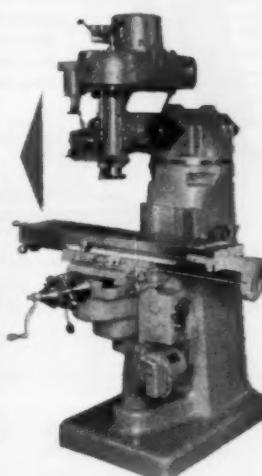
*Super
"55" MILL*



1½ HP Head or optional 2 HP with continuous duty motor gives 50% or more capacity . . . More rigidity, more accuracy . . . Increased horse power and dynamically balanced Cast Iron Pulleys and Drive System afford improved production capacity . . . More weight in the column, heavier ribbed column, heavier knee, heavier saddle.

Unique square design of overarm affords more rigidity, greater accuracy . . . Provides extra range and capacity . . . More power at the cutter. No adjustment required on overarm and head after use . . . No need to re-indicate head after moving overarm . . . Speed range with nine changes makes possible the use of high speed or carbide tipped cutters to best advantage.

"45" MILL



Index Machine Co.

540 N. MECHANIC STREET JACKSON, MICHIGAN

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January, 1958

251

Lubricator ends hand filling

The Wilkerson automatic Auto-Fill lubricator system is designed to eliminate the need for manual filling. This system will assure a sufficient oil supply in all lubricators with negligible attention, the manufacturer claims.

All lubricators are supplied with oil from one source, with no limit to the number in use. They do not interfere with the operational air pressure, as

all units can be operated on different pressures if desired.

Wilkerson Corp., 1602 W. Girard Ave., Englewood, Colo.

Use postpaid card. Circle No. 413



Auto-Fill lubricator—constant oil supply assured.

SPRING LOADED LIVE CENTER



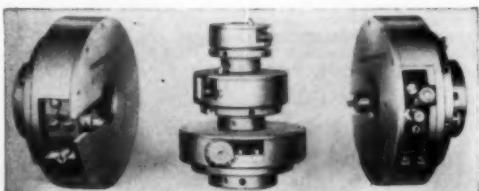
Eliminate excessive overhang of your center. Use the accurate, rugged, reliable *NIROL. The spring loaded Live Center that compensates for expansion and contraction in actual operation.

Write
for complete
information.

*Reg. U.S. Pat. Off

***NIROL** MANUFACTURING COMPANY
900 H'WAY 22, N. PLAINFIELD, N. J.

Use postpaid card. Circle No. 401



MUMMERT-DIXON FACING HEADS with Automatic Feed

One-way Tool Feed—8, 9 and 12" sizes.

Two-way Tool Feed—9, 12, 16, 20, 24, 30, 36, 40 and 46" sizes.
Save many costly set-ups.

Bulletin No. 4141 Gives Full Details

MUMMERT-DIXON CO. 122 Philadelphia St., Hanover, Pa.

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RING PUNCHES AND DIES

STANDARDS



ROUND



SQUARE



BLANK



RECTANGULAR



OBLONG



PILOT



TYPE R DIES



TYPE R DIE



TYPE P DIE



SLUG EJECTOR PUNCHES

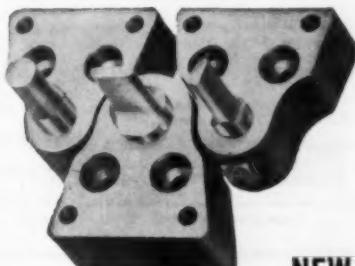
HIGH SPEED BEVEL
& SHOULDER HEAD QUILLS

COMPLETELY INTERCHANGEABLE
SHIPMENTS FROM STOCK
CHOICE OF STEELS
HIGH QUALITY
LONG LIFE
LOW COST



SPECIALS

Send prints or sketches for quotation on your requirements. Prompt deliveries—reasonable prices.



NEW!

PUNCH & DIE RETAINERS

Tough alloy retainers accurately machined for Ring Punches and Dies. Ease of mounting saves time and money.

Circle No. 380

WRITE FOR ILLUSTRATED CATALOG 105

RING PUNCH & DIE, INC.

27 FENTON PLACE

JAMESTOWN, NEW YORK

Stainless steel fasteners resist high temperatures

Camloc Fastener Corp. supplies special fasteners to airplane manufacturers. A problem arose when certain customers started to produce jet planes. Body parts of the fastener used in propeller-driven planes and made of a non-ferrous metal would not withstand the higher temperatures—500 to 900 F.

Various materials were considered

but proved too expensive and difficult to fabricate. An effective and economical answer was found in precipitation hardening stainless steels. Body parts were replaced with precision castings of 17-4 PH. This made possible thinner sections with no loss of strength.

For Holes & Cores in Less Time USE THE RIGID BOREMASTER FREE CUTTING

Five sizes available for holes or cores from $1\frac{1}{2}$ " to $11\frac{1}{4}$ " and to a depth of 8".



BOREMASTER is not a Fly Cutter, but a Heavy Duty Trepanning Tool with retractable Pilot. Two blades cut simultaneously—a lead blade and finishing blade—giving good stability and chip load distribution. Stock is removed in one piece.

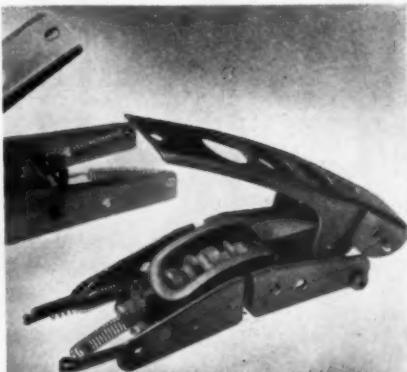
SAVED TIME AND MATERIAL
MEAN MORE PROFITS FOR YOU

Also available without pilot for turret lathes
Sole USA Representatives:

**NEISE
MODERN TOOLS**

**KARL A. NEISE
404 4th Ave., Dept. MT
New York 16, N.Y.**

Use postpaid card. Circle No. 404



Special fasteners for jet planes.

Four springs made of 17-7 PH strip and wire were used in the redesigned fastener in place of music wire and high carbon steel parts. This provided the necessary spring properties and resistance to high jet engine heat. Fabricating qualities and good corrosion resistance also were important factors.

Armclo Steel Corp., Middletown, O.

Use postpaid card. Circle No. 114



SOLID TYPE

Hardened and Ground Tool Holder Bushings

These new tool holder bushings are hardened and ground and priced lower than conventional soft bushings. Most sizes in stock for prompt delivery. $\frac{3}{4}$ " to $3\frac{1}{2}$ " O.D.—any bore. Send for descriptive literature.



SPLIT TYPE

**THE GAHR MACHINE CO.
19195 ST. CLAIR AVE.
CLEVELAND 19, OHIO**

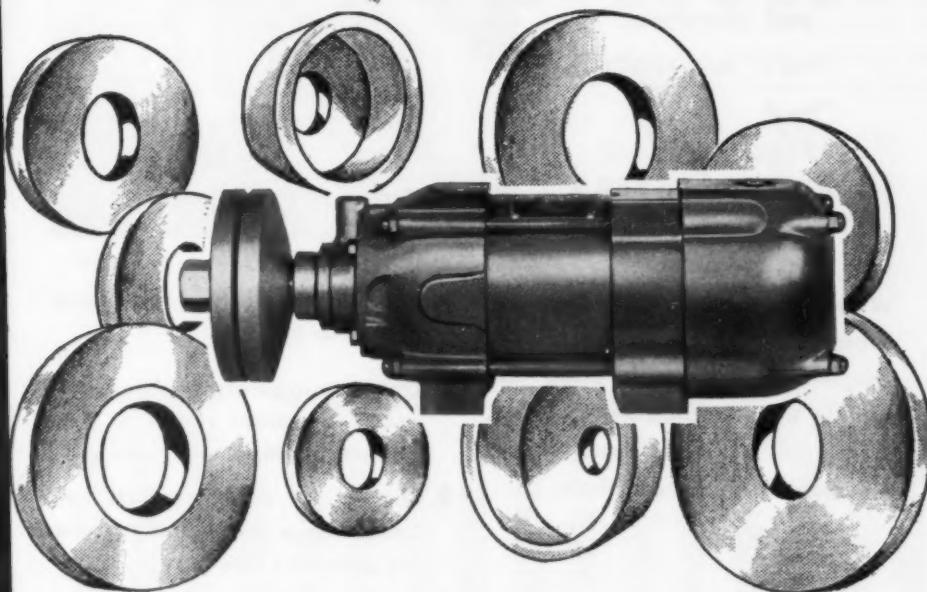
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MACHINE and TOOL BLUE BOOK

Serving the Industry Since 1852



POSITIVE POWER with a **WOODS MOTOR ARBOR**



Precision built and "tape insulated," WOODS motors are available in a wide variety of types and range from one to one hundred horsepower. Extremely adaptable for use requiring precision balance, a minimum of space and delivering the maximum of power. Why not investigate the advantages of these time-and-money saving motor arbors for your plant today?

Send for descriptive material

MOTOR DIVISION

S. A. Woods Machine Co.
27 DAMRELL STREET
BOSTON 27, MASS.

Use postpaid card. Circle No. 406

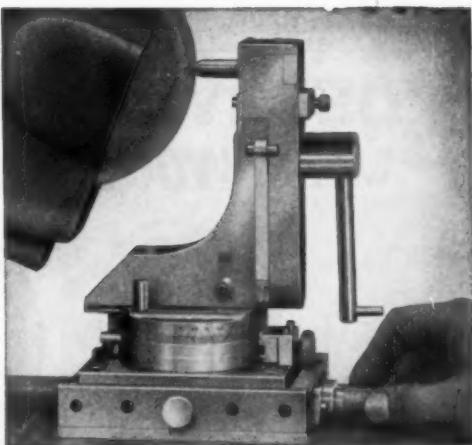
Tough Grinding Wheel Forms Dressed Easy as A, B, C

eliminate elaborate set-ups
and operations

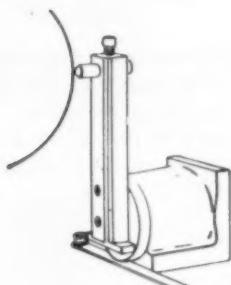
.0001" ACCURACY

Fluidmotion
WHEEL DRESSERS

dress two angles tangent to a radius
in one continuous motion



With the unique "Fluidmotion" Dresser, you can dress two angles tangent to a radius — using one handle in one continuous motion. Operation is so fast and simple that beginners can use them.



Adaptable to all type cylindrical and surface grinders.

- A. Obtain micrometer reading; add required convex radius or subtract required concave radius.
- B. Loosen jib with wrench and "mike" over lower pins to reading obtained above.
- C. Tighten jib. Set stops for two angles. Ready for action.

Also available: "FORM MASTER" Dresser, capable of dressing any radii up to 12" convex, up to 15" concave.

See your industrial distributor or write for free literature.

WHEEL DRESSERS

J & S
TOOL CO., INC.

JAW CLAMPS • PRECISION VISES • DOWN HOLDING DEVICES

J & S TOOL CO., INC.

Use postpaid card. Circle No. 407

CLAMP CUT

882 DORSA AVE.
LIVINGSTON, NEW JERSEY

MACHINE and TOOL BLUE BOOK

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1A

1B

1C

1D

2A

2B

2C

2D

3A

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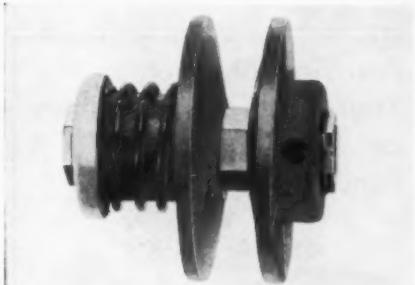
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Molded-plastic variable speed pulley

Mechanical equipment and a wide range of control systems can use this Model VP-1 pulley to provide variable-speed operation. Molded of impregnated nylon Fiber-glass, the pulley is self-lubricating, has extreme chemical resistance, and exceptional long-wearing qualities.



The unit measures 1 $\frac{1}{8}$ " O.D. with a maximum 1 $\frac{5}{8}$ " pitch diameter. It has a range of 2 $\frac{1}{4}$ times and a spring-loaded tension, with shaft bores of $\frac{1}{4}$ ", $\frac{5}{16}$ " and $\frac{3}{8}$ ". Weight is less than 3 ounces.

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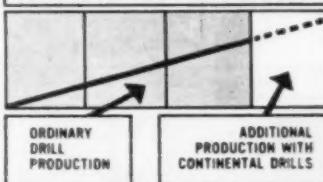
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IN 11 SIZES—No. 6 to 1^{1/2}
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Here is the faster, more precise way of transferring open and blind screw holes—make savings in "wage-dollars-per-hour" of your expensive hands on every job. A die-and-tool maker's tool with many other applications for die makers and machinists. A set of 6 Hardened Screws nested in combination holder and wrench—no other tools needed. Get more work now—save money too!

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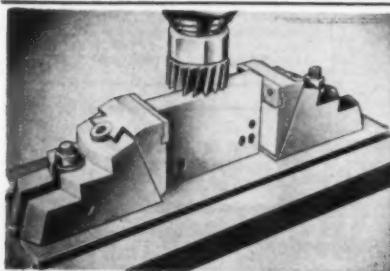


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MASTER GRIPPING CLAWS System Hubner

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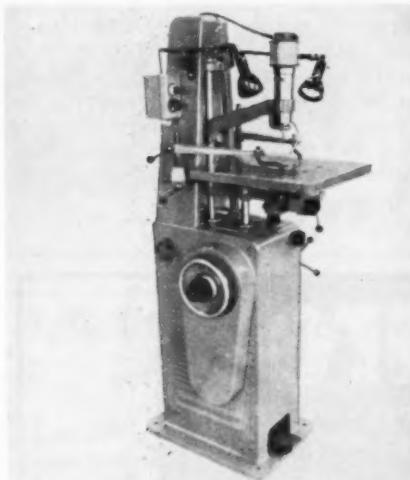
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Toolmaking machine has rotary, reciprocating motions

Rotary and reciprocating motions are available simultaneously on the Williams Roto Recipro toolmaking machine. All types of tool steels, carbide form cutting tools, contoured tungsten carbides, and hardened steels may be machined through this method.

Diamond tools, carbide files, grinding points, and carbide burrs are utilized. Conventional tension and compression



Williams Roto Recipro toolmaking machine—for use on tool steels, carbide form cutting tools, contoured tungsten carbides, hardened steels.

New Model "SS" **RADIUS DRESSER**

OUTPERFORMS THEM ALL

Cut production time without sacrificing accuracy! Easy to set, easy to see, eliminates necessity of guard removal. Somerset Radius Dresser turns "tricky" jobs into routine operations.

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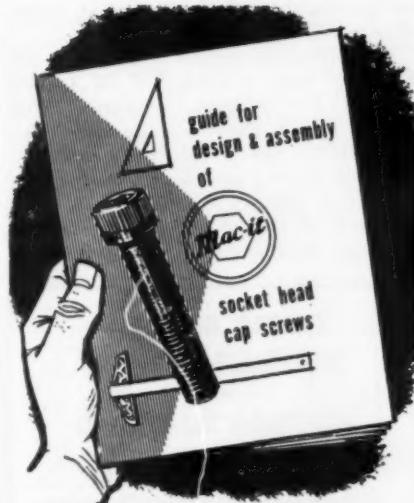


New Low Price
\$124.50 with Diamond

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January, 1958



YOUR COPY IS READY

Send today for this brand new 8-page guide for the design and assembly of Mac-it Socket Head Cap Screws. It contains valuable information on these widely used fasteners, much of it new and never published before, including:

TORQUE-TENSION DATA — Exclusive, easy-to-use graphs show tightening torque required to produce desired screw tension. Torque and tension recommendations are shown to simplify accurate, efficient design and assembly.

COMPLETE TECHNICAL INFORMATION — Highly useful reference data on these screws includes physical characteristics, specifications, dimensions, thread lengths for standard stocked sizes and other helpful information.

Every design engineer, draftsman and production supervisor should have a copy. You can get yours from your local Mac-it distributor or write: Mac-it Screw Division, Strong, Carlisle & Hammond, 1392 W. 3rd Street, Cleveland 13, Ohio.

That same distributor also maintains complete, local stocks of America's first and finest alloy steel screws

Socket Head Cap Screws • Button Head Socket Cap Screws • Flat Head Socket Cap Screws • Hollow Set Screws • Hollow Lock Screws • Hollow Pipe Plugs • Socket Shoulder Screws • Hexagon Head Cap Screws • Square Head Set Screws • Tool Post Screws • Square Head Collar Cap Screws • Slotted Headless Set Screws • Hex Socket Keys

**MAC-IT hex socket
alloy cap & set SCREWS**

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259

filing as well as sawing and honing is obtainable through the use of an interchangeable file bracket.

Reciprocating motion is infinitely adjustable with a range of 85 to 500 strokes per minute, combined with rotary speeds rheostatically controlled up to 45,000 rpm. Fluted work table 18" x 18" is ground and flash chromed for wear and friction resistance.

Depth of throat provides machining capacity to center of 22" diameter with

a maximum work thickness of 4½". Table tilt is inclinable front or back and left or right to 10° or in combination with graduated vernier plates.

Connecticut Tool & Engineering Co., Round Hill Rd., Fairfield, Conn.

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Electric furnace quality alloy steel

Byloy grade W2 is a high strength, fatigue and abrasion resistant alloy, a combination of manganese, molybdenum, copper and boron alloyed with steel. The new metal is suitable for general road construction equipment.

Byloy is suitable for cold and hot forming, shearing, flame-cutting, forging, machining and weld joining. It is available in hot rolled plates and bars, or can be supplied heat treated to the customer's required hardness range.

A. M. Byers Co., Dept. RH, Steel Sales Dept., Box 1076, Pittsburgh 30, Pa.

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WARD THREAD GRINDING COMPANY

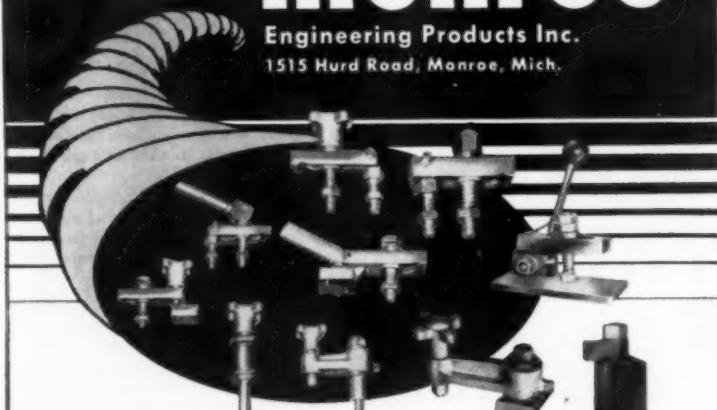
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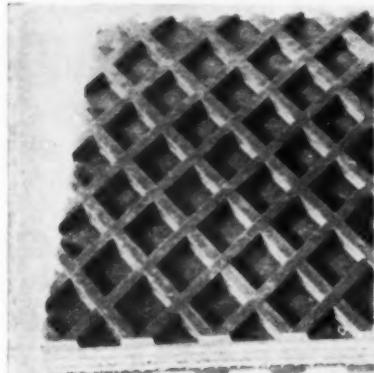
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Anti-vibration pad features resiliency

The Air-Loc laminated machinery mount is made of vinyl, sisal and cork. Each lamination is a separate vinyl-impregnated needled fabric.

The pad in actual use under produc-



Air-Loc mount—layers of vinyl, sisal, cork.

tion machinery is claimed to have good spring-back, which prevents the material from taking a deep and permanent set. This feature helps to retain the vibration damping characteristics of the mount. Crisscross surface construction prevents equipment in operation from "walking" across the floor, even though no bolts or cement are used with this method of vibration control.

Clark, Cutler, McDermott Co., Franklin, Mass.

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BY A QUICK, EASY INEXPENSIVE METHOD
Your business letterhead will bring literature
WATTS BROS. TOOL WORKS
Wilmerding, Pa.

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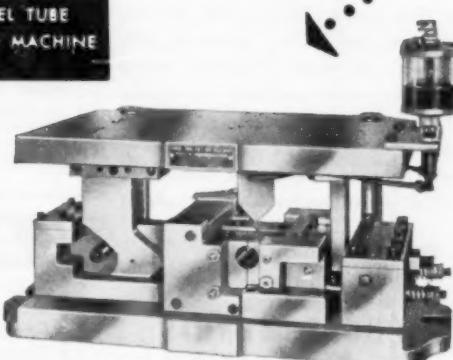
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CUT-OFF MACHINE

- LENGTHS of $\frac{1}{2}$ inch or more are accurately cut to $\pm .010"$ with each stroke of press—actually less than $\frac{1}{2}$ of a second or faster than any other known method.
- In addition to being rapid and precise, the Vogel Cut-Off also cuts clean with a minimum of burr and distortion. Many thousands of cuts can be made before shear blades require sharpening.

- Unit No. 12 accommodates tubing up to $\frac{1}{2}"$ O.D. with $3/32"$ wall; the No. 2 takes tubing up to 2" O.D. with $\frac{1}{8}"$ wall.

- Ask for sample showing how clean-cut your tubing can be sheared with this machine.



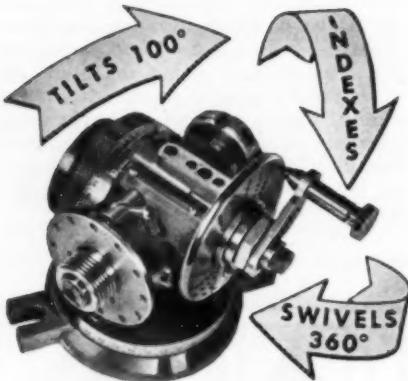
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VOGEL

TOOL AND DIE CORPORATION

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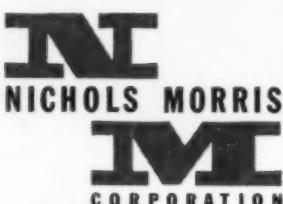
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FOR FASTER PRODUCTION

THE ELLIS DIVIDING HEAD

Although it is built to fine instrument standards, the ELLIS is a really rugged tool room or production tool that's designed to unusual versatility. Its universal motions—swiveling in two planes—will save time and increase profits and accuracy on your millers, grinders, drill presses and jig borers. It has 6½" swing, or 11" swing when used with riser blocks. Work may be held between centers, or in chucks or collets. To save rehandling of work, and to save money, investigate the ELLIS by writing for complete details!

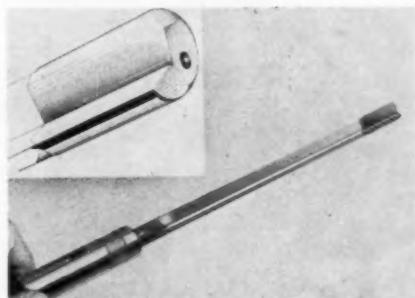


**76-G MAMARONECK AVE.
WHITE PLAINS, N. Y.**

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Single-flute carbide tools drill holes from solid

This line of single-flute carbide gun drills, drills precision holes from the solid in a single operation. They produce close-tolerance long or short holes in ferrous and non-ferrous parts.



Star single-flute gun drill with solid carbide tip.

Drills are designed for operation on machine tools equipped with pressurized coolant systems in conjunction with a drill bushing. Long wear life and high feed rates are permitted by carbide tips that are brazed to the tubular steel body through which pressurized coolant is directed to the cutting edge.

Made in two designs: for hole diameters up to 13/16-in., a solid carbide tip design is used, drills for holes above this size and up to 1½-in. dia. are provided with an insert-carbide tip

CAM MILLING

Fully equipped modern machine shop with extensive Jig Boring, Surface Grinding, Horizontal Boring and Thread Grinding facilities as well as modern Cam Milling and Cam Grinding equipment.

Your Inquiries Answered Promptly

HIMOFF MACHINE CO., INC.
23-22 44th Road Long Island City 1, N. Y.

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MACHINE and TOOL BLUE BOOK

design having one carbide cutting tip insert and two carbide wear strip inserts.

Drill shanks can be made straight or tapered in accordance with customer specifications. Drill lengths are also made to customer specifications.

Star Cutter Co., 34500 Grand River Ave., Farmington, Mich.

Use postpaid card. Circle No. 118

Dial caliper gages

The internal model is an instrument in measuring small holes at deep depth, as well as hard to reach O ring grooves. The external model measures thickness of steel and complex stampings, as well as being used in the plastics industry for measuring the wall thickness on molded parts.

Titan Tool Supply Co., Inc., Dept. RH, 1419 Hertel Ave., Buffalo 16, N.Y.

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TO INCREASE PRESS EFFICIENCY

MINSTER CLUTCHES FOR PRESS CONVERSIONS



MINSTER Combination Air Friction Clutch and Brake — made by a press manufacturer who knows your problems.

Here's why it is profitable to convert to Minster Clutches:

- Eliminates down time because of clutch failure
- Reduces maintenance by eliminating costly and frequent parts replacement
- Increases die life because of smooth, shock-free clutch engagement
- Reduces operator fatigue and improves safety because press is easier to operate, easier to control
- More productive cycles per hour on single cycle operation
- Easier, more rapid die setting

Bulletin CC 57 describes Minster Clutches for press conversion.
Copy by request on company letterhead.

THE MINSTER MACHINE COMPANY
MINSTER, OHIO

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economically priced press room equipment

DURANT Automatic Stock Reels

Operates by natural spring of uncoiling stock. Priced from \$75.00. Nine other models of stock reels in vertical, horizontal, motorized or automatic types for all applications.

Manufacturers of Stock Reels, Roll Feeders, Straighteners, Scrap Choppers, Die Pullers, Foot Presses, Coil Cradles, Press Guards, Stock Oilers.



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PROVIDENCE 3, RHODE ISLAND
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NIELSEN Heavy Duty Live Centers

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Adapted
for heavy
duty work.
Precision type
ball and roller
bearings assure
maximum capac-
ity for high speed
production and long
service.

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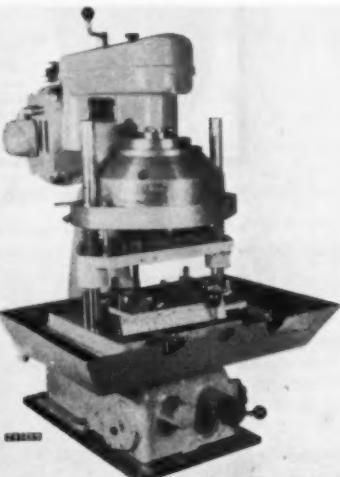
Small drill press is compact, self-contained

Zagar Inc., 23900 Lakeland Blvd., Cleveland 23, Ohio, has announced the application of its gearless drill head to a separate line of small drill presses.

These presses can be equipped with small diameter, medium duty drill heads. The table, which holds the part to be drilled, moves upward into the rotating drills, being fed at a recommended rate to drill the holes. Travel of the table, feed into drills, and return travel downward of the table are automatic cycling. The table, in this instance, carries an index fixture, so that 25 spindles will drill a total of 50 holes, 25 holes simultaneously in two passes. The table is actuated by hydraulic control, with cylinder in the base.

The drill press features small size (about three feet high), compact and self-contained operating mechanisms, adjustability for height, and ease of maintenance and operation.

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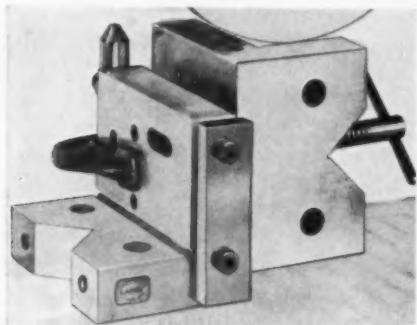


Zagar simplified tooling on small drill press.

V-block angle plate improved

An improved Master V-block angle plate is made of machine steel, uniformly carburized and hardened to a depth of .070 thousandths per side with a surface hardness of 64 to 66 Rockwell. This provides a thick, hard outside case to resist wear, while the soft inner core remains stable, maintaining accuracy over a long period of time. Angle plate is thoroughly seasoned between grinding operations for an equal thickness of case on all surfaces.

Every surface of the tool is finished. A side gage automatically provides for positioning the work precisely without the aid of a surface plate or square. This reduces possibility of error due to faulty surface plate, square of jogging of work while transferring from sur-



Lassy angle plate has hard outer case, soft core.

face plate back to chuck. Required set-up time is reduced to seconds.

The adjustable parallel, which attaches to the side of the angle plate, is infinitely adjustable, provides a work shelf of desired height. A stepped clamp with elongated slot provides for holding even smallest pieces with ease and accuracy.

Lassy Tool Co., Plainville, Conn.
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HIGH SPEED DRILLS

FLAT TWISTED AND ROLLED SECTION

Unexcelled in Quality and Performance!

* SINCE
1903

HI-DUTY Flat-Twisted and Rolled Section Drills are produced by forging and hot twisting bars of high speed steel. This method improves the structure by preserving the grain of the steel. Sizes range from $\frac{1}{8}$ " to $\frac{3}{4}$ " and larger. Milled type drills are also available—from $1/64$ " to $\frac{1}{8}$ " diameter. Hi-Duty means long-lasting economical service!

SPECIAL DRILLS

We manufacture a large variety of special types of high speed drills—special diameters and lengths; also step drills.

FAST DELIVERY . . .

We can make immediate shipment from stock on many special drills. Contact your Industrial Supplier . . . or write today for Catalog and Price List.

HI-DUTY DRILL WORKS
FLEETWOOD, PENNSYLVANIA

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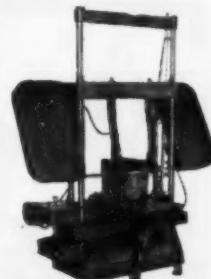
More Capacity per Dollar

MODEL J-24 Capacity 24"x24". Largest capacity per dollar of any comparable saw. Completely hydraulic. Variable speed drive. Rugged, all welded steel construction. Trussed guide posts for extra rigidity. Big $1\frac{1}{4}$ " blade on four band wheels handles large or small jobs with ease. Complete with coolant.

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Model J-24



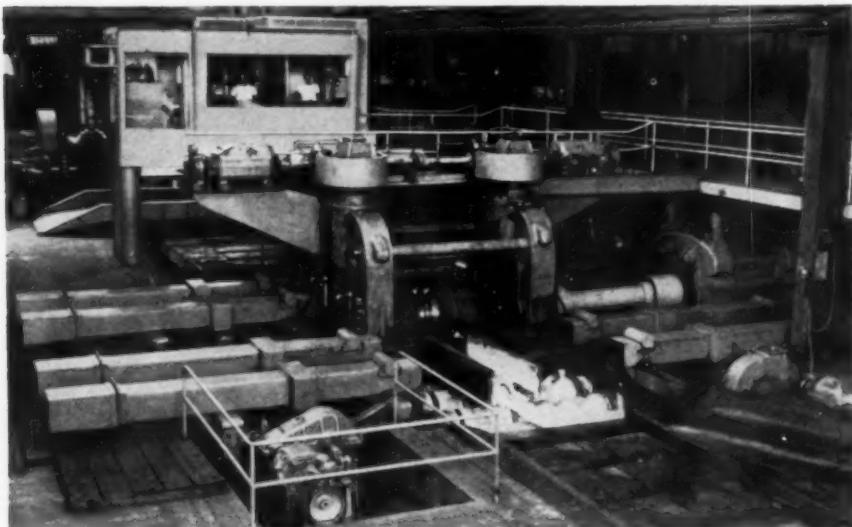
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Large Rolling Mill Designed for Highspeed and Superalloy Steels

The first big rolling mill has been developed to roll superalloys and high-speed steels.

The 32-inch cogging mill was developed by the Latrobe Steel Co., Latrobe, Pa. It replaces the time-honored method of using large forges to hammer or press exceedingly hard steels.

The mill will "squeeze" ingots which begin as large as 18 inches square and weigh as much as 4,000 pounds. It can produce billets as small as three inches square, or slabs up to 12 inches wide. The rolls can turn fast or slow; the opening between the rolls, which controls the rate of reduction, can quickly



Latrobe's new 32-inch cogging mill. Control pulpit is at rear. Extending outward at lower left are manipulators which slide back and forth in conjunction with similar manipulators facing them, and aim ingots at the correct rolls. Note the couplings to the right of the rolls: they transmit power to the rolls and are said to be the largest of their type ever built.

A black and white advertisement for GATCO rotary bushings. On the left, there is a technical cross-sectional diagram of the bushing assembly. Labels include 'ROTARY' pointing to the rotating inner race, 'PILOTING' pointing to the outer race, and 'ALUMINUM FITTING' pointing to the housing. To the right of the diagram is a large, metallic, cylindrical component of the bushing. Above this image, the text reads 'SEALED PRECISION BALL BEARING CONSTRUCTION'. Below the image, the word 'GATCO' is written in a large, stylized, italicized font.

ROTARY BUSHINGS FOR DRILLING, CORE DRILLING ROUGH AND FINISHED BORING

The inner race of the GATCO bushing rotates with the tool, piloting and tool accurately below or above the work—or both.

Eliminates expensive tool construction—Reduces tool wear—Prevents seizure and pilot breakage—Especially adapted where precision is required.

Write for full information and prices

ROTARY BUSHINGS

4235 ANN ARBOR ROAD, U.S. 12, PLYMOUTH, MICH.
Telephone PLYMOUTH 1472

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and accurately be set from the control pulpit.

The new roll design makes it possible to handle the "super-tough" alloys produced by Latrobe. Rolls are diamond-grooved, to distribute the hot deformation more uniformly, particularly in the center of the ingot being rolled. This action produces the "kneading" required to compact and refine the internal cast structure of the ingot.

With its furnaces and other allied

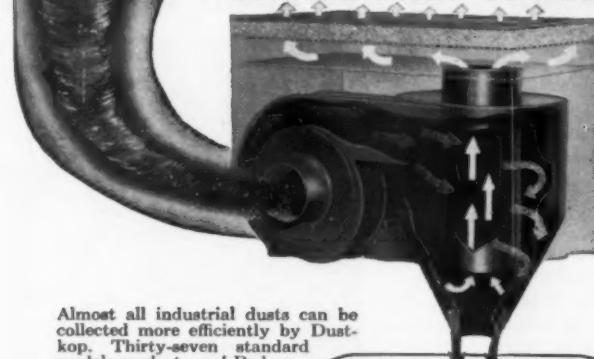
equipment, the new mill occupies about the area of a city block and represents an investment of over \$3,000,000.

The furnaces have ten sections, controlled so that as many as ten different heating temperature cycles can be used simultaneously. Ingots are carried on carts through the furnace. No matter what section a particular cart may occupy, it receives its pre-set cycle of heating.

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CYCLONE SEPARATION

FOR MORE EFFICIENT
DUST COLLECTION
—FILTERS LAST LONGER



Almost all industrial dusts can be collected more efficiently by Dustkop. Thirty-seven standard models ready to use! Reduce installation costs — save space. Write for descriptive literature.

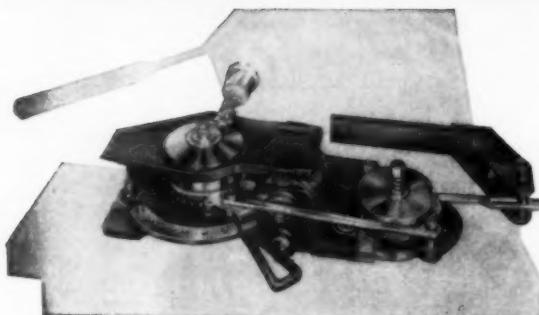
ALSO A COMPLETE LINE
OF MIST COLLECTORS



AGET MANUFACTURING COMPANY
1402 EAST CHURCH ST., ADRIAN, MICH.

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The Dearborn AUTOMATIC INDEXER . . .



connected to a Dearborn chucking fixture does all except put the piece in the collet.

THE CHUCK

is closed automatically
is indexed automatically
is opened automatically

THE PIECE

is knocked out automatically

The Dearborn fixture can also be supplied with degree indexing which permits indexing of any odd angle or combination of two odd angles.

*Write for
illustrated literature*

J. W. DEARBORN and CO.
72 CLIFF ST.

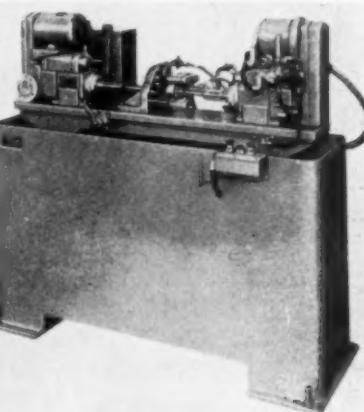
ANSONIA, CONN.

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Double End Machine Performs Opposed Operations Simultaneously

Parts up to 28" long can be drilled, centered, spotfaced, chamfered, reamed, tapped, threaded, hollow milled or bored on a versatile machine designed to perform opposed operations simultaneously. It may be used with a small index table, manual or air clamp fixtures, hopper or vibration feeds, and is available with either manual or automatic interlocked cycle. It is also adaptable to multiple head operations and will perform two operations per hole when fitted with an index table.

In the illustration the double end ma-



Hartford Special double end machine drills, centers, spotfaces, etc.

chine is equipped with two standard

model 19-150 hydraulic drill units which provide a drilling capacity of 5/16" diameter in mild steel. Tapping capacity is $\frac{3}{8}$ ". With a maximum stroke of 1 $\frac{1}{2}$ ", spindle speed range is 300 to 10,000 rpm, with a feed range of 0 to 70 inches per minute. The rapid approach rate is 350 ipm, the rapid return rate 300 ipm.

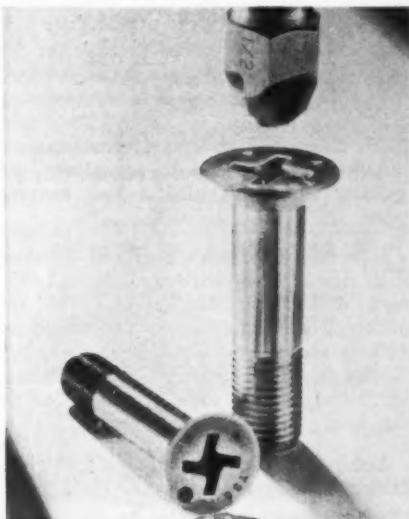
Machines are available completely assembled or as separate components for assembly by the user. The base, which is equipped with a coolant tank and pump, chip tank and coolant trough, is 40 inches high, 22 inches wide and 65 inches long. It is a ruggedly constructed steel weldment and requires no special installation.

Hartford Special Machinery Co., 26411 Homestead Ave., Hartford 12, Conn.

Use postpaid card. Circle No. 123

Recess on aircraft screws permits maximum tightening torques

The Torq-Set SPS recess—which allows maximum tightening without cam-out, burred slots or broken heads—has



January, 1958



WOODRUFF KEY SEAT CUTTERS



High speed steel. Arbor type. Correct dimensions for Woodruff Keys, with 1/32" oversize O.D. to permit resharpening. Regularly furnished without clearance on side teeth.

For quality, price and service investigate Keo combined drills and countersinks, T-slot cutters, center reamers and lathe mandrels. Big stock for fast delivery.

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Jobbers' inquiries invited**

KEO CUTTERS, INC.

25040 Easy St.
Roseville, Michigan

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CONSULT THE
NEW Abart CATALOG

FOR THE BEST
SELECTION OF
SPEED REDUCERS
and GEARS

- Data-Packed
- Pocket Size

REQUEST YOUR FREE COPY OF THIS VALUABLE CATALOG TODAY

The new Abart Catalog offers 92-pages of valuable information, engineering data, detailed drawings and photos. Here is a brief outline of how to select the *exact* Abart Speed Reducer or Precision Cut Gear for any application—fast, easy to use.

SPEED REDUCERS—75 models to choose from—spur, worm or combination gears, single or double reduction. Ratios up to 10,000 to 1; ratings from 1.50 to 168 hp.

GEARS—Custom-made from any gear material to your exact requirements—NO STOCKS. Pitches from .96 D.P. to 5.7 D.P. Request Gear Bulletin.

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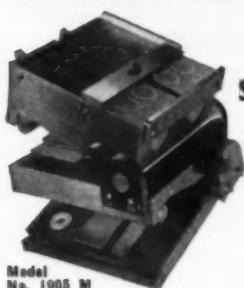
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269

MAGNETIC SINE PLATES

COMPOUND AND SINGLE ANGLE



New Dual Field permanent magnetic chucks with extra holding power. Positive lock on each axis.

Model
No. 1905 M

The new Dual Field permanent magnetic chucks, with a center T slot, allow either side to be magnetized independently. All models are accurate to .0002" in dimensions and parallelism. A .2000" recess is provided for small angles.

Write for catalogue and prices on full line of Bald Eagle Sine Bars and Plates.

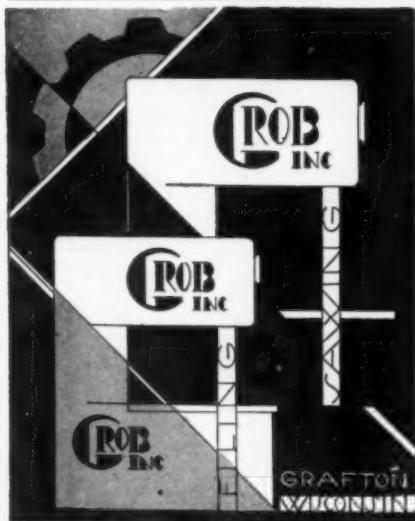
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been introduced on 100° flush-head aircraft screws. Since their recommended minimum pre-load when properly tightened, is greater than the maximum service load, these screws with the new recess won't fail in service. Resistance to vibration can be increased in these screws by the addition, to the threaded portion, of Nylok inserts, an optional self-locking feature available on these bolts and screws.

Basic design innovation that permits greater tightening torques is that the driving surfaces of the recess are located radially from the central perpendicular axis of the screw. This permits the tightening effort to be applied squarely around the vertical axis where the applied torques are most effective.

Standard Pressed Steel Co., Dept. RH, Box 336, Jenkintown 52, Pa.

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Radius form tools offer toughness, fine edge

Jet-Cut A radius form tools are claimed to make possible substantial savings to manufacturers doing turning operations on lathes, turret lathes, and automatic turning machines. They are made from a high speed steel recommended for long life on operations requiring toughness and a fine cutting edge.

Six styles of concave and convex tools are offered, with radii from 1/32" to 9/16" by 64ths, and up to 11/16" by 32nds. Tool shank sizes available are 1/4" square, 3/8" square, 1/2" square, 5/8" square, and 3/4" square. Both right and left hand cutting tools are included in the line.

Lund Mfg. Co., Cutting Tool Div., 8 Music Hall Ave., Waltham, Mass.

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MACHINE and TOOL BLUE BOOK

Disposable fountain pen

A disposable fountain pen for industrial uses named Mark-All, is a heavy-wall polyethylene squeeze tube with a felt writing point and filled with an ink that writes on both porous and non-porous surfaces. Being already filled, it is ready for use; just remove the cap and write. Replace the cap and it is safe to carry.

Ink dries in seconds, adheres to all metals; to almost all plastics; to glass,



Mark-All disposable pen—seven colors of ink.

leather, wax. Markings may be removed from non-porous surfaces, although the ink is resistant to water, gasoline, oil, naphtha, carbon-tet, vapor degreasing and other solvents. Ink resists heat to 400° F. Baking at 350° F insolubilizes markings.

Pen is supplied in black, white, yellow, red, orange, green and blue.

Organic Products Co., P.O. Box 428, Irving, Tex.

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QUICK ACTION VISE (Size No. 7)
For drill press or milling machine. Designed for production work, using eccentric motion to apply pressure to jaws. Eccentric parts hardened to insure long life. 6" jaws, 1½" deep, opens 4". Price \$111.00

SHAPER VISE with Graduated Square Swivel Base (Size No's 4 & 40)
Base is graduated and has tongue in center to fit slot in table. Also holes for bolting down.

Size No. 4—6" jaws, 1½" deep, opens 5". Price \$109.50

Size No. 40—10" jaws 2½" deep, opens 8½". Price \$148.50

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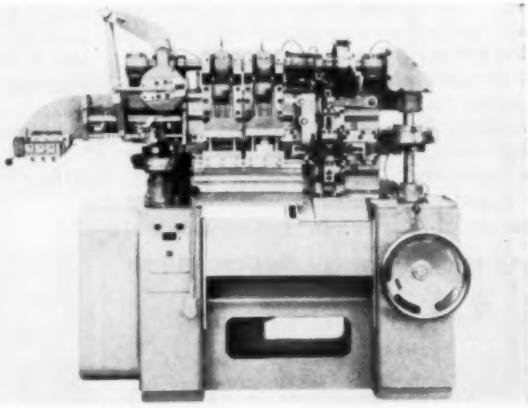
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CHICAGO 8, ILL.

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All-Purpose Vertical Four-Slide Machine

An all-purpose vertical four-slide machine, the Verti-Slide, features good visibility and accessibility to all parts of the machine, as well as reduced floor space. Most operations can be conveniently accomplished by the setup man while standing upright in front of the machine. Adjustment of the feed stroke, cams, presses, and cut-off are made at the same position.

The parts are ejected from the front of the machine. Conveying and handling for secondary operations is easily mechanized.



Torrington Verti-Slide four-slide machine.

The center form is mounted in the bed, providing both a strong, rigid mounting and good view of the tool-

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STEP UP PRODUCTION 20% +

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272

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MACHINE and TOOL BLUE BOOK

ing area. An extra-large mounting plate enables large tools to be fastened securely and economically.

All important bearings of the centralized lubrication system are connected through nylon tubes to an air-operated pump. Depending on the bearing size, from .003 to .009 cubic inches of grease is forced onto the bearing surfaces through metering valves at predetermined intervals.

Because the clutch is between the flywheel and the cam shaft system and the flywheel rotates continuously, the energy in the flywheel is available for jogging, and the machine can be stopped quickly since the flywheel can be instantly disconnected.

The hand wheel is automatically separated from the main drive when the clutch is engaged, eliminating a safety hazard.

The presses, for which there is space for three, are crank-type units having a ball pitman. Because they are vertically mounted, slug disposal is no problem.

Slide and slide bases are separate assemblies which can be removed from the bed, permitting the use of special attachments or slides. All wear surfaces are hardened steel.

The optional positive stock clamp attached to the front slide is completely independent of the top slide's travel, permitting use of the stock clamp for

other purposes like light punching or as a secondary slide for forming.

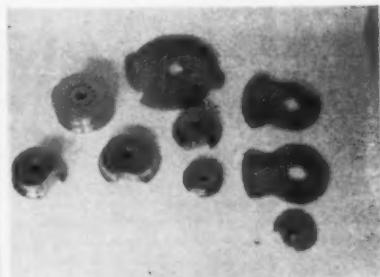
The Torrington Mfg. Co., Torrington, Conn.

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Spacer table affords automatic positioning

Industrial East Co., Clifton, N.J., has announced the availability of its automatic positioning spacer table for use

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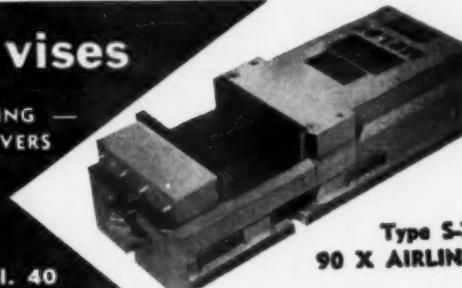
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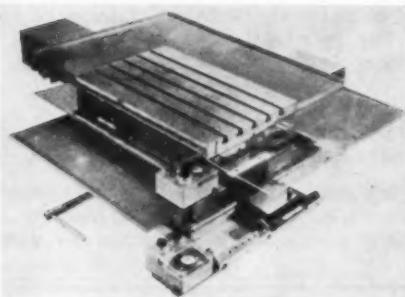
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in any shop equipped with a drilling or boring spindle.

The accuracy of the spacer table depends solely on the accuracy of the spindle under which it is used. Drilling and tapping may be performed with out jigs. Drilling-reaming and boring are done to close tolerances without boring fixtures.

Construction of this table makes pos-

sible the performance of heavy duty drilling. There is no over-hang and the wide bearing areas make it the equivalent of an almost solid mass of high grade cast iron and heat-treated steel.

Locations may be established by any of a variety of methods. First piece or tool room work may be done by using gage blocks or end measures and micrometers. Practically any measuring units may be used. The spacer table will also accommodate Duplitrol bars, which may be purchased to individual specifications or to one-inch spacings from the DeVlieg Machine Co.

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Automatic air-hydraulic converter

The air-hydraulic converter incorporates the patented Recno-Aire micro-valve air motor and a highly efficient



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Why tie up your big, costly jig borers on small work when you can get maximum utility at less cost per hour on a machine exactly fitted to your work. Put your small work on the LINLEY where it belongs and reserve your large machines for large work, where large work belongs. You'll save money this way.

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Table Size:
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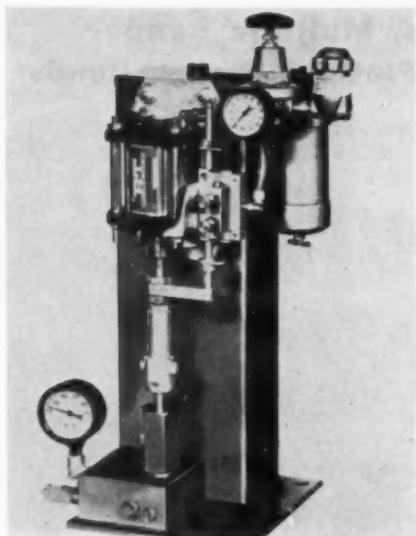
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hydraulic pump and reservoir—all in a single, compact unit that is light in weight, portable and capable of continuous heavy duty service at full output. The variable stroke pump is instantly adaptable to any hydraulic requirement. This converter handles a complete range of hydraulic requirements for heavy and light industrial, aircraft, wood, plastic and rubber and laboratory applications.

A single air connection controls hydraulic output. The unit will operate

at air pressures as low as 5 psi minimum to 100 psi maximum, providing a hydraulic range from 0 to 10,000 psi, with full and accurate control at all pressure requirements. Hydraulic accuracy of 1/10 of 1% can be maintained.

Renco-Toledo, Inc., Dept. BJ, 3358 W. Alexis Rd., Toledo 13, O.

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Immediate shipment from factory stock, $\frac{3}{8}$ " to 3" diameters by eighths.

Write or wire for catalog prices, or for quotes on specials.



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SPELLMACO "SPOTTERS"

A matched set of transfer punches
for toolmakers, machinists & tool cribs

Used for transferring location of threaded, drilled
and reamed holes, slugs, blanks, etc.

Precision made of finest tool steel—Carefully heat treated and tempered for long life—.0025 undersize to facilitate use—Black oxide finish.
SET #3-17, 28 punches with indexed stand—sizes 3/32" to 1/2", by 1/64"—
plus handy 17/32" size. Length 4 7/8" ONLY \$17.90.
Single sizes available

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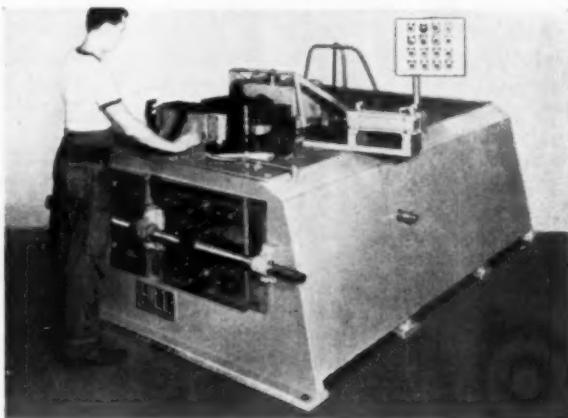
January, 1958

275

Combination Punch Press, Multiple Bender Simultaneously Pierces, Flattens, Coins, Bends

A fully automated horizontal punch press and multiple bending combination machine is hydraulically powered. Press bending principles are utilized to simultaneously pierce and countersink holes, flatten, coin weld projections, and produce multiple bends in two tubular parts at a time at a net production rate of 1440 pieces per hour.

Machines of this type may be adapted to the production of tubular



Hill fully automated horizontal punch press and bending machine.

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MILFORD REZISTOR® HIGH SPEED STEEL BAND TOOLS

Specially designed for cutting stainless steel and other tough alloys, this red-hardness high speed steel blade cuts many times faster and lasts far longer . . . cuts consistently straighter and smoother with less chip loss.

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BUY FROM YOUR MILFORD DISTRIBUTOR . . . a local businessman who stocks the tools and equipment you need. You'll SAVE TIME, CUT BUYING COSTS and REDUCE INVENTORIES.



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HIGH SPEED STEEL

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furniture, automotive and aircraft molding and trim. They will also handle angle, square or rectangular-sectioned shapes.

In the machine illustrated, the operator loads one right-hand and one left-hand straight tubular part into the dies and presses twin safety cycle start buttons. The hydraulic-powered ram advances at high speed under low pressure, simultaneously piercing and counter-

sinking four holes, flattening an area, and coining two weld projections in each part under high pressure. At the same time, the parts are clamped in location.

Subsequent operation of twin cams advances wing die sections, causing the two parts to be bent around die forms to produce three bends in each part. As the three rams retract, the finished parts fall in an elevating mechanism

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Convenient storage of Drills, Tools, Tops. Insert tapers from 7½" at top to 17" at bottom. Label Holders in Each Shelf.

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BAY PRODUCTS INC.

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Philadelphia 32, Pa.

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that transfers them to a conveyor for the next automatic operation. The 5-sec machine cycle is repeated when the elevating mechanism returns to loading position.

A two-pump hydraulic system in the machine avoids sequence valves and their related adjustment, balance and maintenance problems. The high and low-pressure pumps both feed the sys-

tem under no-load conditions to provide high ram speeds. During the piercing, forming, and clamping operations, where high pressures are required, the low-pressure pump is automatically cut out. This leaves the high-pressure pump in the system to provide large clamping forces.

Subsequent bending and sequencing operations utilize the low-pressure



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OPERATE EFFICIENTLY AT USUAL CARBIDE
SPEEDS, YET PERFORM BEAUTIFULLY AT THE
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pump only, with the high pressure pump maintaining the clamping forces. Both pumps recombine to feed the system during ram return when fast action is desired.

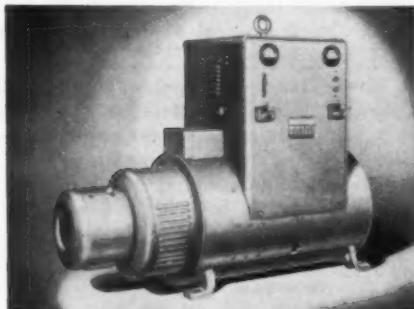
The wing dies on the machine can be reversed in both position and action to form S-shaped sections. The bed construction permits the addition of hydraulic cylinders for forming, piercing, flattening and cutoff operations after the bending is done.

Walter P. Hill, Inc., 22183 Telegraph Rd., Detroit 19, Mich.

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Carbon-air cutting machine

As a power source for the carbon arc and compressed air method of cutting and gouging all kinds of metals is the 1200 ampere model. It is rated 1200 amperes on 100% duty cycle and



has a maximum output of 1600 amperes. The 900 ampere model is recommended for carbon electrodes up to $\frac{1}{2}$ " in diameter and the 1200 ampere model is recommended for carbon electrodes over $\frac{1}{2}$ " in diameter. A single rheostat gives a wide range of voltage control. This along with the self-regulating features of the carbon electrode, provides control for all sizes of carbons used in carbon arc and compressed air cutting and gouging.

Hobart Bros., Co., Dept. RH, Troy, O.
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AIR GRINDERS

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50,000 R.P.M.

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Weight 12 ounces;
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Wheel guard removed
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The RPM's stay up while
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High speed grinding with small
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It was born out of a pressing need
in our tool room. Because tool
room grinding problems are uni-
versal, we believe it will pay you
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tool room as generally as we do
in our own.

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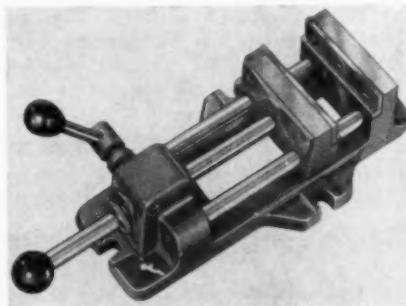
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280

Drill press vise for rigid, non-rigid work

This wide range drill press vise safely
handles both rigid and non-rigid work
without distortion. A simple turn of
the front adjusting screw bushing varies



L-W Adjusto-Quick Control 4" drill press vise.

the jaw pressure from 1 to 1500 pounds.
It is being marketed as the L-W Ad-
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and fixture holder.

The 4" wide removable jaw inserts
allow quick adaptation for low cost
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is 5½". Hand pressure on a hardened
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the work fast.

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**NEW NESTING TYPE
TOTE PANS**



Sturdy 16 ga. metal.
20" long x 12" wide
x 6¼" deep. Drag
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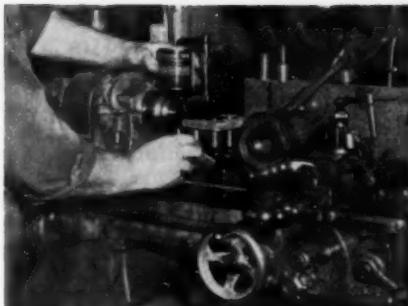
J. L. LUCAS & SON, INC.
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MACHINE and TOOL BLUE BOOK

Material is wear-resistant, self-lubricating

Devcon WR can be cast without heat or pressure. This wear-resistant, self-lubricating material has been used successfully for such applications as guides on textile machinery, low speed bearings, building up surfaces subject to severe wear, making duplicating masters and forming dies. Because of its resistance to most acids, alkalies, solvents and other chemicals, it has proved of value for lining tanks and repairing chemical equipment. The compound is supplied in paste form and upon the addition of a hardening agent it becomes a syrupy liquid which can be cast or poured into a variety of shapes. Only two hours after the addition of the hardening agent, the material becomes so tough and rigid that it cannot be machined except with carbide or similar tools. No heat or pressure is required for hardening.



Devcon WR used to repair gouge in lathe bed.

Material is supplied in one, four, and fifteen pound containers and also as a trial kit. Each package contains the amount of hardener required, sufficient release agent, measuring spoons, and complete directions. A trial kit made up of four one-pound cans, along with the necessary components, sells for \$11.40.

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- WIDE RANGE TAP CAPACITY.

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No. 2B POSITIVE TAPPER — capacity $\frac{3}{4}$ " to $\frac{7}{8}$ " in Steel.

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• PRODUCTION THREADERS with Round Split . . . Button . . . Acorn Dies.

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January, 1958

MORRISON 1" AUTOMATIC KEYSEATER

Investigate the many features of this new Keyseater. It has automatic feed, automatic stop to cut off feed at given depth, automatic relief to back the work away from the cutter, automatic centering, automatic lubrication and no bushings required.

Write for more information on the finest Keyseater on the market.



THE D. C. MORRISON CO.
P. O. BOX 1817C • CINCINNATI 1, OHIO

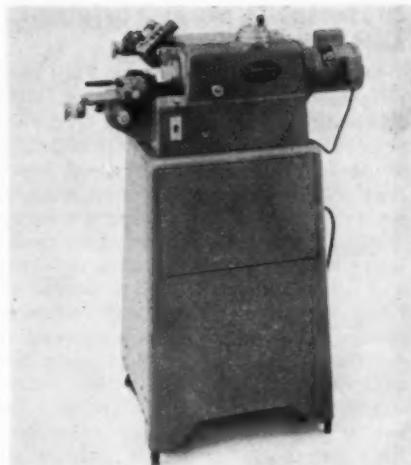
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281

Drill grinding machine for spiral point drills

A complete precision drill grinding machine for applying the newly developed "spiral point" to standard twist drills is offered by Cincinnati Lathe and Tool Co., Cincinnati, Ohio. The revolutionary concept in drill point geometry was recently announced by research engineering at Cincinnati. (See our November issue, page 138).

The Spiropoint drill sharpener is designed to grind the new precision drill point geometry quickly, accurately and economically. The drill is held stationary and the generating system gyrates around the drill axis to produce the desired shape on the end of the drill. An adjustable truing device is provided for dressing the small tubular grinding wheel so that the point angle of the drill may be varied from about 90° to 180°.



Spiropoint sharpener applies spiral point to drills.

The machine is built in two sizes, Model 500 to accommodate drills from

Greenerd

ARBOR PRESSES

For Assembling: Keyway Cutting, Broaching, Piercing, Oil Grooving, Straightening, Forming, Pressing, and many other jobs.
65 Standard styles and sizes.
From $\frac{1}{4}$ to 20 tons pressure for manually operated presses.
From $\frac{1}{2}$ to 75 tons pressure for motor driven hydraulic presses.
Originators of the Arbor Press.
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GREENERD ARBOR PRESS CO.
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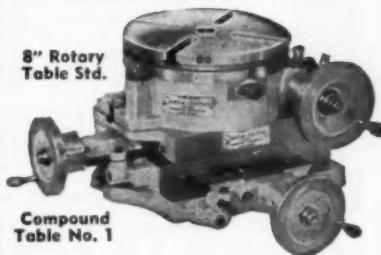
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282

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8" ROTARY TABLE STD.

Compound Table No. 1

ROTARY TABLES, 5-8-12-15-18-24" sizes both standard & dial indexing types.
ADJUSTABLE TILTING TABLES, #1-2
COMPOUND TABLES, #1-2
ROTARY-COMPOUND TABLES #1-1½-2
INDEX CENTERS - multiple spindle

See your dealer or write for bulletins

The JOHN B. STEVENS Company
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MACHINE AND TOOL BLUE BOOK

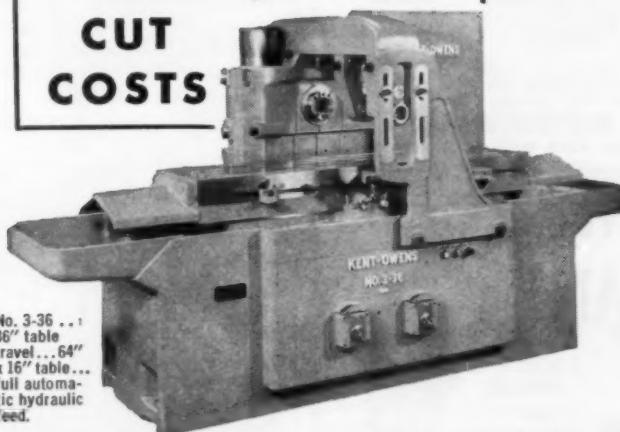
$\frac{1}{8}$ " to $\frac{1}{2}$ " diameter, and Model 750 for drills from $\frac{1}{8}$ " to $\frac{3}{4}$ ". An attachment is available which enables both models to grind from No. 60 (.040") to $\frac{1}{8}$ " drills.

In operation, the drill is placed between vise jaws on the advancing slide of the machine, then located against a retractable stop, and clamped in place. It is then advanced so as to engage the continuously gyrating wheel

which is mounted in a rotatable carrier. The correct combination of radial and axial motions for the size of drill being sharpened is set automatically in the machine by a dial-indicated adjustment located on the top of the unit. An adjacent smaller dial provides adjustment for values of relief above or below the standard amount in order to meet special requirements.

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Mill Faster **CUT COSTS**



Operators like 'em . . . because Kent-Owens Machines are extremely simple and practical. Turn out milling jobs *fast*, with minimum worker fatigue! Twin-post head mounting assures balanced load. Only two gear contacts, motor to cutter, for greater cutting efficiency. Write for bulletins on wide range of single and double spindle hydraulic and hand-operated machines. Also, let Kent-Owens design and build your tooling and special machines. Kent-Owens Machine Co., Toledo, Ohio.

Call on **KENT-OWENS**
for MILLING MACHINES

Use postpaid card. Circle No. 454

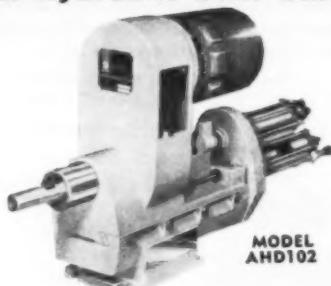
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GOTHA

Production Machine Tools

Automatic

Air-Hydraulic Drill Units



Capacity $\frac{1}{8}$ " to $\frac{5}{8}$ " Drill 4" or 6" Stroke,
No. 2 M.T. A Note On Your Letterhead
Will Bring Full Details.

GOTHA INC.
Box 430B Harvey, Illinois

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RIVETERS..

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PIONEERS
and
PACEMAKERS
in their line



—head rivets from smallest to $\frac{3}{8}$ " diameter either by NOISELESS SPINNING or VIBRATING HAMMER method—sizes to meet all needs—types include Vertical and Horizontal Multiple Spindles

Write for literature and
don't forget to send samples

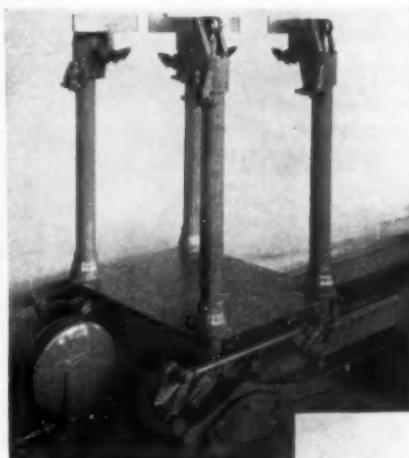
THE GRANT MFG. & MACHINE CO.
CE Station,
Bridgeport 5, Conn.

Use postpaid card. Circle No. 456

Automatic transfer unit loads 400 racks each hour

Design principle of a new fully automatic transfer unit, developed recently by Wagner Brothers, Inc., 7800 Dix Rd., Detroit, for a large appliance producer, can be adapted to other mechanized materials handling transfer problems. The unit, currently used by the appliance builder as an automatic, double-lane loader and unloader in a plating operation, can be adapted to transfer parts from conveyor hook to machine, from belt to machine, from machine to machine etc.

At the plant of the appliance producer, the unit is being employed to handle home laundry appliance parts, unloading and loading two racks at a time at the rate of 200 per hour each—400 racks each hour. In this installation each rack is designed to hold



Test setup for automatic transfer unit. Reel, left, is used to supply power, but in a permanent installation a safety power bar supplies the power—working along lines of a trolley car. Cam, foreground, actuates all four of the pickup V-plates above, through a system of mechanical linkages. Slope of cam is amplified in the path of the V-plates.

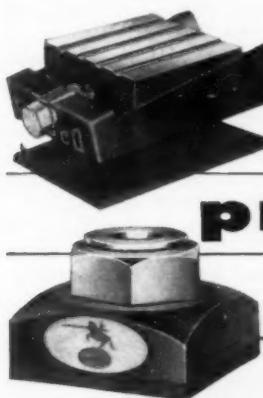
300 lb. The automatic setup eliminates the use of any personnel.

The transfer unit can be operated either hydraulically or electrically. Hydraulic power is used for short carriage strokes and electric for the longer strokes.

In operation, the transfer setup picks up the work from the two conveyor hooks and transfers it to the work-

carrier hooks—upon which the unfinished work is moved out of the loading station by the machine and the finished work moved into its place.

The transfer unit, which dwells during the machine index, then moves to the left, transferring the two finished work racks from the machine work carrier hooks onto the two empty hooks of the conveyor—which in turn had re-



How to
keep
precision
in a precision
machine

**SET YOUR MACHINES LEVEL AND KEEP
THEM LEVEL WITH EMPCO LEVELING JACKS**

You're paying for precision. *But . . . are you getting it?* Improper leveling and excessive vibration can seriously impair the precision performance you pay for in costly machine tools. Set your machines level and keep them level with EMPCO Leveling Jacks! EMPCO Jacks provide a solid, smoothly adjustable foundation for machine tools, large surface plates, automation lines, tool room and production

equipment of all types. Easily installed, they increase machine efficiency, reduce downtime and maintenance. Periodic releveling is a quick, easy one-man job. Combined with VI-SORB Mounting Pads, EMPCO Jacks control internal and transmitted vibrations, reduce noise and retard machine creepage. Jacks available in six styles, 25 models. Pads cut to fit.

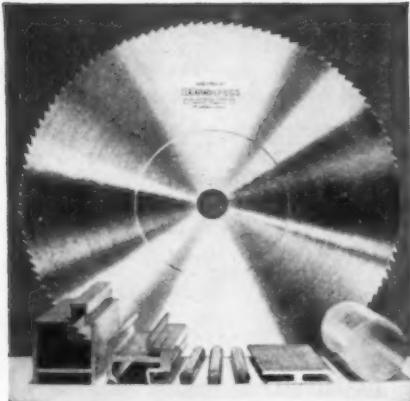
Send Today for Descriptive Bulletin No. 100—
The Enterprise Machine Parts Corporation
2715 Jerome Avenue • Detroit 12, Michigan

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January, 1958

285





**Finest edge holding—
qualities of any saw**

DISSTON

DISS-CROLOY CIRCULAR SAW

For non-ferrous metals and plastics

Maximum hardness combines with toughness! Disston Diss-Croloy Circular Saws are scientifically heat-treated for hardness. For toughness, they're made of high-carbon, high-chrome steel. That's how Disston can give you a saw with superior edgeholding qualities.

Reduced sawing costs! Disston Diss-Croloy Circular Saws last longer. Need less frequent sharpening than other saws. Reduce downtime. And—you get more and better cuts from each blade.

Fast, prompt delivery! There's no long wait for a Disston Diss-Croloy Circular Saw! Large stocks are always on hand. Diameters in stock range from 6" to 16". Other diameters are also available.

Disston Division, H. K. Porter Company, Inc., Phila. 35, Pa.

H. K. PORTER COMPANY, INC.
DISSTON DIVISION

Use postpaid card. Circle No. 458

mained stationary during the preceding motion.

The finished work is now indexed out of the conveyor loading station and the unfinished work moved into its place. Then the cycle repeats. This principle also can be arranged for handling one rack at a time.

Use postpaid card. Circle No. 136

Roll feed line improved

Besides the seven new sizes of standard models, certain new features and refinements have been added to the Durant roll feed line.

A new larger handwheel permits easier starting of material through the rolls.

A new type ratchet brake is now standard on all models. This makes possible easier brake adjustment and more accurate feeding.

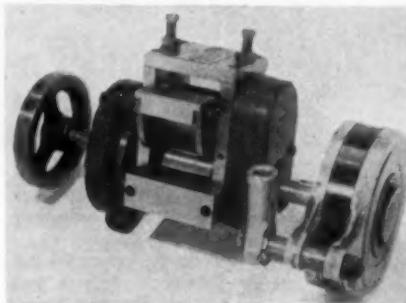
Rolls are now supplied either hardened and ground or knurled, as required by the customer.

A new type tool steel is now being used in the ratchets of the Selectomatic indexer on the roll feeds to minimize wear and give longer life.

The design of the top roll tension springs have been changed to give longer life and to give greater top roll adjustment for thicker material.

Durant Tool Supply Co., 1-15 Thurlers Ave., Providence 5, R.I.

Use postpaid card. Circle No. 137

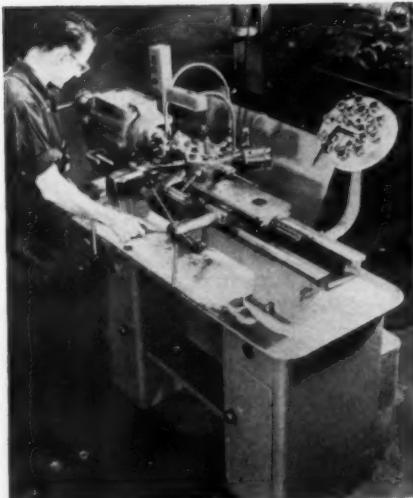


Durant Model No. 8 roll feed.

Hand screw machine for short-run work

This machine combines the time and cost-saving features of rapid chucking and multiple tooling with the advantages of low initial investment, low maintenance costs and power consumption, minimum set-up and changeover time, and small space requirements. It is described as ideal for repetitive manufacturing of a wide variety of parts ranging from simple pieces such as washers and shafts to the most intricate parts such as those used in the electronics and aircraft industries or any operation involving production of a limited number of precision parts. This hand screw machine can machine as many as 50 parts in the time it would take to produce one on an engine lathe.

The machine features a bed turret with six stations for up to six oper-



ations. The turret is moved quickly from one operation to the next with a simple turn of the pilot wheel—and

Commander **SELECT A SPINDLE**

DUAL SPEED DRILL PRESS TURRET

DRILLS, REAMS, TAPS ON 1 DRILL PRESS SPINDLE!

- Fits Any Drill Press • Increases Production
- Reduces machine, fixture costs

Commander Select-A-Spindle permits you to do 3 operations on a single drill press spindle . . . save time . . . eliminate multiple handling of piece parts, speed production and reduce overall costs. Dual Speed Select-A-Spindle permits selection of proper speed for each operation. Quick, positive hand indexing positions each tool accurately for sequence operations. Select-A-Spindle is built to tap with any 1, 2, or all 3 spindles to the full capacity of the unit. Adjustable torque control spindles for protection of taps to $\frac{1}{4}$ " available.

Write for illustrated circular on Select-A-Spindle, other Commander Production Tools and name of your nearby Commander Distributor

Commander MFG. CO.

4227 W. KINZIE STREET, CHICAGO
PRODUCT OF COMMANDER
BUILDER OF PRODUCTION TOOLS

Use postpaid card. Circle No. 459

the work piece is chucked in a fraction of a second by a touch on a conveniently located lever. A pilot wheel feed combines rapid slide movement with a full 8-inch travel which greatly increases the size range of jobs the machine can perform.

Delta Power Tool Div., Rockwell Mfg. Co., Dept. RH, 475 N. Lexington Ave., Pittsburgh 8, Pa.

Use postpaid card. Circle No. 138

Automatic-drain air line filter

Automatic-drain air line filter has simplified design of drain mechanism, efficient liquid removal, and a wide pressure and temperature operating range. Metal bowl automatic-drain filter is available in $\frac{1}{4}$ ", $\frac{3}{8}$ " and $\frac{1}{2}$ " sizes.

Simplification of the drain mechanism resulted in fewer parts and an in-

Precise

SUPER 40

CUTS OPERATION COST

44%

On
Carpenter's Level
at

STANLEY TOOL CO.
NEW BRITAIN, CONNECTICUT



Our Case History M-101

PROBLEM: To route out casting flash and to de-burr center areas of carpenter's aluminum level.

FORMER METHOD: Hand filing.

PRECISE METHOD: One PRECISE Super 40 Grinder Miller mounted in inverted position under work bench, with T.C. Midget Mill projecting above work surface.

RESULT: A much better, smoother finish and actual cost reduction of 44%!

PRECISE GRINDER MILLERS

Modern Industry's Most Versatile Power Tool

Only PRECISE offers all these features:

Super Speeds up to 45,000 RPM.

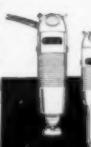
Powerful $\frac{1}{4}$ H.P. output at precision ground and honed collet chuck, up to $\frac{1}{4}$ " size.

Strong, one-piece aluminum alloy housing, precision machined on inside and outside.

Suited for hand grinding and milling as for mounted applications on standard machine tools.

Complete line of machine tool mounts and accessories available.

Send for Free Catalog containing our complete line of Grinder Millers and Power Quills from $\frac{1}{8}$ to $1\frac{1}{2}$ H.P. and their amazing adaptability to modern day precision production.



Precise

PRECISE PRODUCTS CORP.

3725 BLUE RIVER ROAD, RACINE, WISCONSIN
Quality and Precision Since 1882

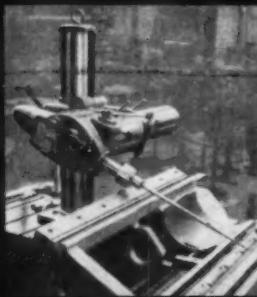
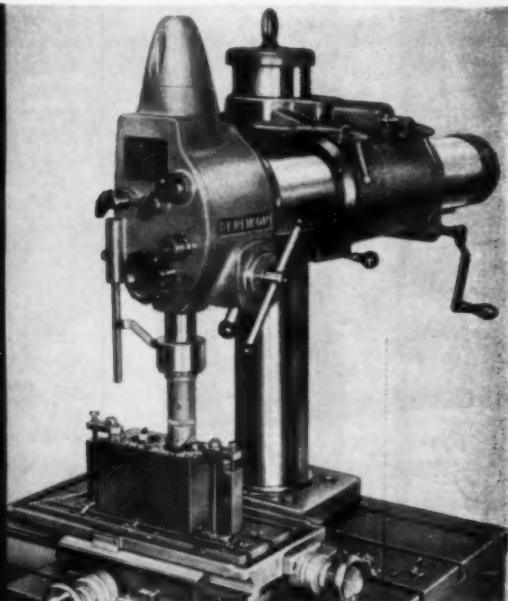
creased efficiency in filtering operation. These filters operate at top efficiency at air line pressures as low as 5 psi for all models—and as high as 150 psi for the transparent bowl models and 250 psi for the metal bowl type. They drain automatically, 24 hours a day, as long as there is pressure on the air system, eliminating manual draining. The float-controlled, pilot

operated drain mechanism discharges only when collected liquid reaches full capacity, not whenever air pressure or air flow fluctuates.

Carefully designed louvers improve the centrifugal action of the entering air, increasing filtering efficiency in removing moisture and oil emulsions. For removing abrasive solids from the air, three interchangeable filter ele-

OERLIKON
UB 2
ALL ANGLE
PRECISION
BORER

The UB 2 performs hundreds of general and specialized workshop operations - drilling, milling, countersinking, tapping, precision and center boring, reaming, facing, trepanning, etc.



- Radial swivelling arm and a freely swivelling head allow handling of any job, even in awkward positions.
- Boring head can be canted to any angle (360°) and accurately latched vertically and horizontally.
- Spindle speeds variable from 30 to 3070 rpm.
- Accessories include precision chuck, tapping heads, collets holder, adjustable boring head, facing and turning head, trepanning tool, boring bars, etc.
- Portable - take it right to the job.

Write for detailed information and prices to:

Olkon Corporation Machine Tool Division
13823 West Eight Mile Road Detroit 35, Michigan
(Some exclusive territories still available)

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290



Norgren filter—simplified for more efficiency.

ments are available—74, 64 and 25 micron.

The metal bowl automatic-drain filter is rugged—recommended for applications that must withstand rough usage. This type of filter extends the operating range for the manufacturer's automatic-drain filters to 200°F and provides an operating pressure range from 5 to 250 psi.

C. A. Norgren Co., 3400 So. Elati St., Englewood, Colo.

Use postpaid card. Circle No. 139



"Hey, boss, that last shipment came back."

MACHINE and TOOL BLUE BOOK

End measuring rods for precision spacing

Series No. 244 end measuring rods for use with jig borers and other machine tools where spacings and table settings must be held to a high degree of precision are available in 1, 2, 3, 4, 5, 6, 7, 8, 10, 12 and 15-inch sizes and may be purchased in standard sets or in any combination of sizes to suit specific requirements. Also available



No. 244 end measuring rods come in 11 sizes.

are two micrometer heads, each of four to five-inch range, graduated to read

CUT PRODUCTION COSTS!
MARK
NAME PLATES
5 TIMES
FASTER

MODEL EMT-2
ELECTRIC TAG TYPEWRITER
A touch of the finger delivers up to 2 tons pressure for deep, legible impressions in metal or plastic tags.

-WITH-
Automark
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Automatically marks BOTH constant and serial numbers at any desired speed up to 8,000 tags per hour!

MANUFACTURER'S AGENTS—
Some Territory Still Available

Send Now for Bulletin

DEFIANCE MACHINE & TOOL COMPANY
1922 S. VANDEVENTER Dept. MT ST. LOUIS 10, MO.

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in ten-thousandths of an inch.

The micrometer heads are identical except that one has a red ring and the other a black ring for ready identification when both are in use. Both have no-glare Satin Chrome Finish for easy reading and corrosion resistance, hardened screws ground from the solid and stabilized, quick-reading figures with every thousandth numbered, contacts precision ground and lapped and lock nut.

The end measuring rods are made of tool steel with satin chrome finish and precision ground and lapped contact faces. Each rod has several concentric collars of $\frac{5}{8}$ " diameter which are ground concentric, parallel and square with the contact faces. These serve as bearing surfaces when the rod is placed in the groove of a machine tool.

The L. S. Starrett Co., Athol, Mass.

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Makes precision internal gaging easy



COMTORPLUG with interchangeable expanding plugs to gage simple or special bores from $\frac{1}{8}$ " to 10" dia.

Investigate the gage used by thousands in jet propulsion, automotive transmission, household appliance and other volume-precision industries.

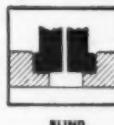
Just say
**"BULLETIN
50"**

Comtor Co., 62 Farwell St., Waltham 54, Mass.

ALSO easily adaptable to SPECIAL PROBLEMS!



SHALLOW
HOLES



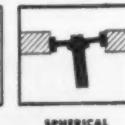
BLIND
HOLES



SHOULDER
WITH
SHORT
THRU
HOLES



SPLINE
ROOT
PITCH



SPHERICAL
HOLES

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MACHINE and TOOL BLUE BOOK

Molten metal pump

Small vertical centrifugal gusher pump Model 9025-M is built for handling molten metals at temperatures up to 700° F.

A safe operating temperature of the motor is maintained by utilizing three aluminum cooling fans, which rotate simultaneously with the heavy one-piece extended stainless steel shaft. Two precision ball bearings, packed with high temperature silicone grease, are confined within the motor. This construction eliminates the necessity for bearings or metal contacts in the high temperature area.

The unit is available with either $\frac{1}{4}$ hp, 1140 rpm or $\frac{3}{4}$ hp, 1725 rpm Class B insulated motor, for capacities up to seven gallons per minute and heads up to eight feet.



Ruthman gusher pump for molten metals to 700° F.

The Ruthman Machinery Co., Cincinnati 2, O.

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.0003 HOLE LOCATION IN 1 MINUTE

EDGE FINDERS

\$2.50 NEW POSTPAID \$10.00 DELUXE
except C.O.D.

- Thousands have proven and accepted the Deluxe Model for years.
- Jumps sideways as shown when location is reached.
- New .500 dia. Model for larger work only.

.200 Dia.

ADJUSTABLE VISE STOP

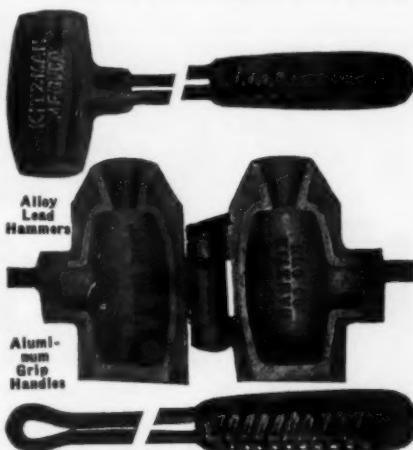
\$2.95

Hundreds Of Pieces To A .0003 Tolerance With This Hardened Visa Stop That Is Adjustable In All Directions. Attach To Vise With One $\frac{1}{4}$ -20 Tapered Hole.
Dealer Inquiries Invited

GLOVER MFG. CO.
422 Park Ave. Meadville, Penna.

Use postpaid card. Circle No. 463

January, 1958



Hinged Hammer Moulds
1, $2\frac{1}{2}$ and 5 lb. sizes—order your alloy lead hammer requirements from your machine tool supply house

or direct from:

KITZMAN MFG. CO.
15061 Hartwell Ave. Detroit 27, Mich.

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293

Double-acting clamp does work of two

A double-acting retracting clamp delivers pressure in two directions simultaneously. The manufacturers claim this is the first clamp in a standard line that will eliminate the use of two



Lodding clamp—pressure in two directions.

clamps for various types of holding.

The clamp is made of forged steel hardened, and in three types of operation—hand knob, nut and hand cam.

Lodding, Inc., Worcester, Mass.

Use postpaid card. Circle No. 142

Truck holds dies to 7500 lb.

An electrically powered JackStacker "walkie" materials handling truck is especially designed to facilitate the handling of dies weighing as much as 7500 lb.

The platform-type truck, which is equipped with a hydraulic pusher and puller, can high stack dies in storage racks, as well as transport and place them directly in press beds. With the pusher-puller attachment on the platform, dies are either pulled on or pushed off the platform by simply throwing a switch.

Operated from a control handle while walking along with it, this truck has a

NOW YOU CAN HAVE...

SPEED, ACCURACY,
RIGIDITY, VERSATILITY,
UNLIMITED OPERATIONS

WITH

MULTI-DUTY
TOOLING SYSTEM

FRY

The Fry Tooling System is manufactured in 11 different sizes with 30 different types of Tool Adapters. Adapter changes are made quickly and accuracy is assured by hardened and ground rest buttons.

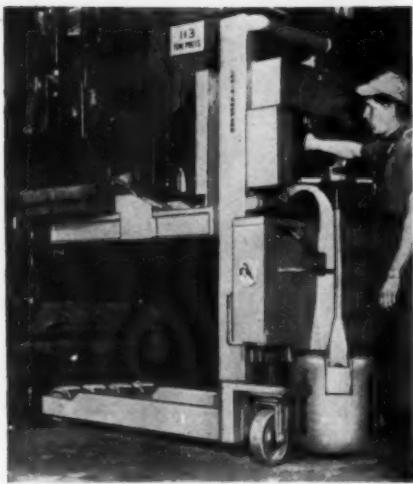
The Fry-Vi-Bra-Damp Boring Bars will eliminate vibration and chatter that you now have on standard boring operations. This scientifically constructed and proven boring bar will be the answer to your chatter problems.

Exclusive representation available in some localities

FRY

FRY TOOL MFG. CO.
EATON, OHIO

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JackStacker truck—operated from control handle.

42-inch long, 32-inch wide platform. The horizontal stroke of the pusher-puller is 42 inches.

Extremely compact, it will maneuver in aisles only 7 ft. wide. It has a platform elevation of 54 inches.

The load-carrying frame of the unit is supported by four rubber-tired rear wheels and two aluminum caster wheels.

Lewis-Shepard Products, Inc., Dept. R-20, 125 Walnut St., Watertown 72, Mass.

Use postpaid card, Circle No. 143

Roller gear drive

The roller gear drive pictured goes to Air Preheater Co., Wellsville, New York, to index a rotating hood on their new giant electrostatic precipitator. The application of this machine, known primarily for its usage as a high speed,

BEVERLY

Pneumatic THROATLESS SHEAR

**FASTER, EASIER
CUTTING
*to any Shape!***

- Compactly built for maximum visibility and efficiency
- Operates on 35 to 150 PSI air pressure
- Adjustable power and return stroke length and speed

CAPACITY
3/16 MILD STEEL
10 GA.
STAINLESS



Beverly Pneumatic Shears combine all the advantages of Beverly Throatless Shears with fast, effortless cutting action through air cylinder operation. Air operation speeds work, permits accurate cutting to a pattern or template, as operator can concentrate on guiding work through the shear. Flow control valves permit precise adjustment of stroke speed; adjustable actuating arm controls stroke length. Foot Switch permits operator to use both hands on the work piece. Operates on 110V 60 cycles AC and 35 to 150 PSI air pressure.

See your nearby Beverly Distributor

BEVERLY SHEAR MANUFACTURING CO.
3005 W. 111th STREET • CHICAGO 43, ILLINOIS

Write for catalog sheet
and complete details.

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LOOKING FOR A
MEMAC?

NO!

Not A Strap
Wrench
Not A Chain
Wrench
YES . . .
IT'S BOTH

THE MEMAC COMBINES THE SMOOTH GRIP OF A STRAP WRENCH AND THE RUGGED STRENGTH OF A CHAIN OR PIPE WRENCH. Unique design controls gripping force—Prevents grip increase from handle pressure. Grip and size adjustment by turning handle. Friction grip—Does not gouge or distort—it ratchets, ideal for turning . . . Hardened steel . . . thin walled tubing . . . Plastic pipe . . . or threaded parts. Constructed entirely of heat treated alloy steel.

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PRECISION GROUND TABLES AT
THE LOWEST PRICES



A size and type to meet your requirement.

For complete information and prices write for Free Catalog No. 22.



TROYKE MFG. CO.

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Cincinnati 41 (Sharonville), Ohio

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precision indexing mechanism in mass production and automatic assembly machinery, required a unit capable of indexing a torque load of 124,700 inch pounds at 24 rpm. The drive housing measures 61" x 53" x 16", weighs almost 5,000 lbs. and contains 60 gallons of oil to lubricate the mechanism.

Ferguson Machine Corporation of Indiana, Dept. BB, P.O. Box 5841, St. Louis 21, Mo.

Use postpaid card. Circle No. 144





Angle attachment—for grinding in confined areas.

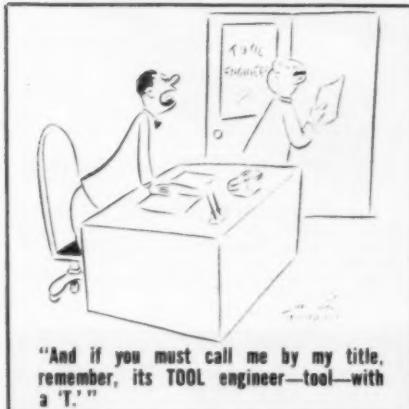
Angle attachment for electric hand grinders

An angle attachment for electric hand grinders permits grinding, polishing, and disc sanding operations in confined areas.

Grinder may be used in horizontal or vertical position. Attachment is suitable for tool room, pattern shop or factory. It is attached to or removed from grinder in seconds.

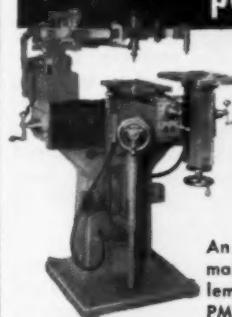
Special Products Co., 1925 S. 16th St., La Crosse, Wis.

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"And if you must call me by my title,
remember, its TOOL engineer—tool—with
a 'T.'"

3-Dimensional panto-miller



Accurate pantographic milling on either flat or curved surfaces.

New

CAPACITY SENSITIVITY ACCURACY CONTROL

An economical answer to many production problems. Send for Bulletin PM3-A.

2-Dimensional panto-miller



Versatile and dependable for continuous service, the J&B "Panto-Miller" 2A:

ENGRAVES PROFILES DIE CUTS MILLS

Write for Bulletin PM2-A.

3-WAY Indexing Trunnion

Simple, Rapid, Positive positioning of workpiece or jig for all angle Drilling, Tapping, or Counter-boring. Available with Chuck, Faceplate, or Right-Angle Adaptor Plate. Complete with Station Selector. For details, ask for Bulletin IT3-A.

AVAILABLE SIZES:

7"	10"
14"	18"
24"	30"

WITH FACE PLATE



EST. 1870

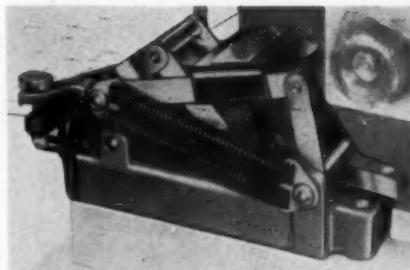
JOHNSON & BASSETT INC.
PRODUCTION TOOL DIVISION
WORCESTER, MASSACHUSETTS

Use postpaid card. Circle No. 471

Press feeds improved

New improvements add strength and efficiency to the Jaco line of automatic press feeds. The carriage bridge is now being made of cast semi-steel to give it greater rigidity and stability, to improve the performance and to increase the useful life of the feeds. A new, quick release lock for the non-return blade provides rapid release, adjustment and locking of the blade. These improvements have been incorporated in the 2", 3" and 4" models.

The feeds are powered by the press ram and handle coil stock in a range of widths up to 4", thicknesses up to 3/32" and with a range of feed stroke lengths up to a maximum of 4". Micrometer adjustment allows feed stroke to be set at an accuracy of .001". They are easy to install, can be mounted on the dieset or press table of any mechanical, hydraulic, compressed air or electrically operated press.



Jaco press feed—for coil stock to 4" wide.

Jaco Devices, Inc., 99 High St., Hingham, Mass.

Use postpaid card. Circle No. 476

Heat treated stationary type die heads

A series of 3" and 4" Landmatic heat treated die heads are designed to produce threads to class 3 tolerances.

Replacing a former 3" and 4" "Z" type series of heads, these heads in-

INSPECTION BY PROJECTION

with the

NEW SCHERR MICRO PROJECTOR

with the
VERTICAL
DESIGN

NEW IMPROVED
Self-Contained
MODEL

featuring

Solid Floor Base... eliminating extra charge for India
Tilting Stage for Holes, Angles
and Bevels.

Two Stage Opening
1/4" Diameter Increases

Carriage Slide adjustable for
vertical or horizontal work.

Carriage made Precision Coated
Leverage for smooth operation
for different objectives 10 to
1000 magnifications.

An entirely new practical
design for Inspection, Research,
Development, Quality Control, De-
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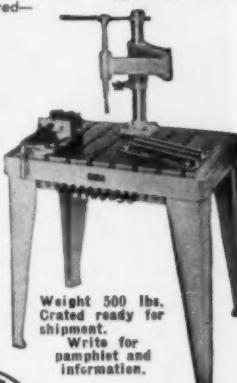
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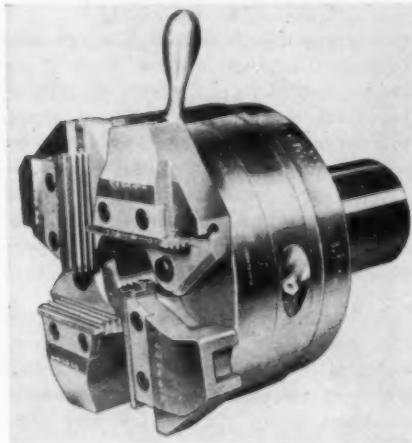
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corporate many new features including: chrom-moly alloy steel construction, heavier head opening springs to facilitate easier closing and faster head opening action, four sets of hardened

pins and bushings to distribute the pressures imposed by large diameter threading, and many others. For coarse pitch threading a roughing and finishing attachment can be furnished as auxiliary equipment.

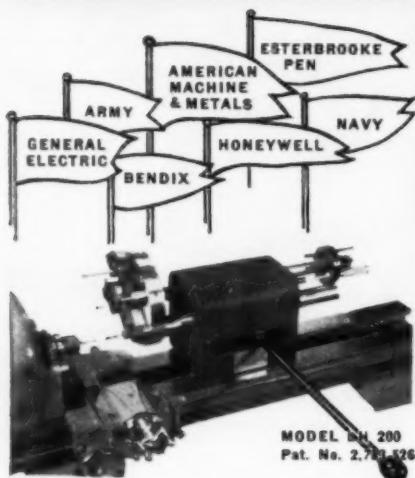
Landis Machine Co., Waynesboro, Pa.
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Embossing presses made more productive

A new line of Minster Series 90 knuckle joint presses ranging in capacity from 150 to 1000 tons for mass production coining, sizing and embossing operations feature greater parts accuracy and longer press life. This is attained by precision building of the knuckle assembly, adjusting wedge, frame members, slide and gibs.

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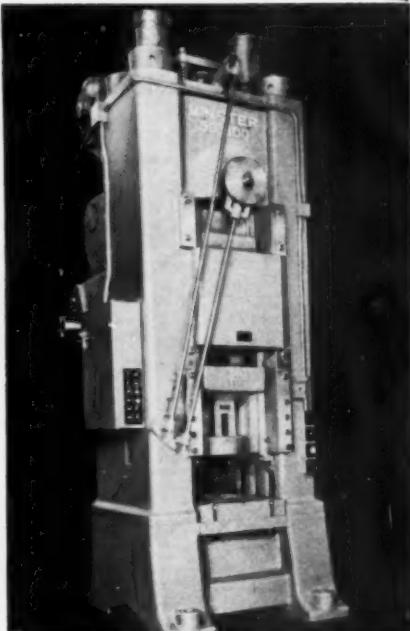
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Minster Series 90 press—new clutch location.

ciency possible. Production is increased because it is possible to get more single stroke operations per minute than could be obtained with the customary clutch located on the drive shaft. Higher press speeds, also a result of the clutch location, give greater velocity of impact which tends to increase the flow of metal in cavity type dies or sizing operations.

A feature of the press is a standard top block lock arrangement that prevents a change in slide adjustment which would cause excessive tonnages, incorrect parts dimensions and machine damage.

The Minster Machine Co., Dept. RH,
Minster, O.

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MACHINE and TOOL BLUE BOOK



Model 1F swaging machine replaces former model.

Swaging machine improved

The Fenn Mfg. Co., Fenn Rd., Newington, Conn., has announced the Model 1F swaging machine to replace the former Model 1A. Improvements include an extra heavy, one piece cast frame that provides rigidity, alignment, and freedom from vibration.

It also features a heavier drive. Motor and electrical parts are mounted within the frame. Machine requires floor space of only 25" x 20½".

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Double-action hydraulic press

The H-P-M 200-ton Fastraverse double-action hydraulic press pictured was recently shipped to a large manufacturer of electrical appliances and equipment for metal forming operations.

To meet safety requirements of the customer, the press is equipped with an 18" curtain of light located across

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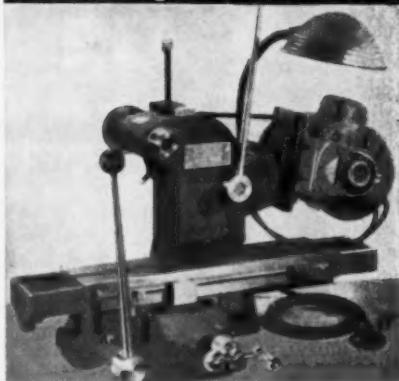
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January, 1958

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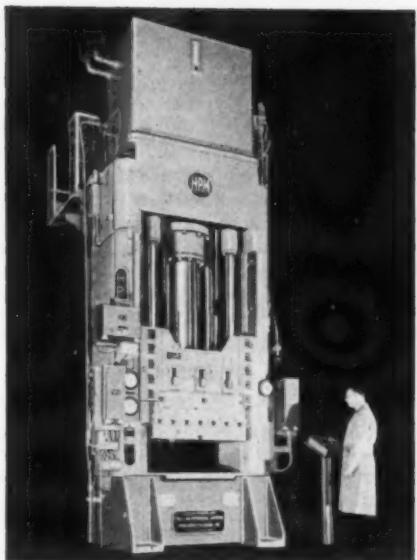


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the front pressing area. When this curtain of light is interrupted, regardless of what phase of the cycle the press is in, a signal is sent to the press control circuit which de-energizes the electrical controls and automatically sets the hydraulic pump on reverse stroke. This lifts the slide to the starting position at the top of its stroke and stops the press. The next cycle cannot be initiated until both forward buttons are depressed by the operator. Thus, any possibility of the operator getting near the pressing area while the press is in operation is eliminated.

The working press area is 36" x 42". It has 56" daylight; the main slide stroke is 36" and it is equipped with a 100-ton blank-holder and a 50-ton die cushion.

The Hydraulic Press Mfg. Co., Dept. RH, Mount Gilead, O.

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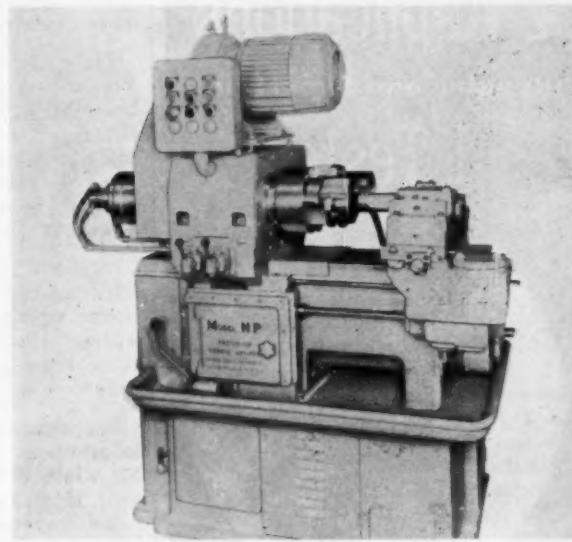
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*Patent Applied For

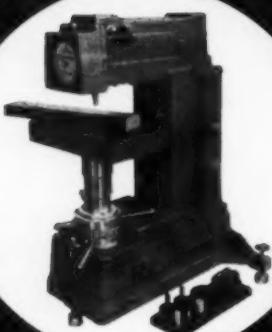
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r.p.m. The design of the headstock bridge permits the installation of other makes of standardized boring heads.

The table or platen is mounted on a Vee and a flat way with very long bearings. With this design, the ways are entirely covered at all times, eliminating the possibility of damage through dirt and chips. Longitudinal movements are obtained by a drum cam which assures a positive feed and better work finish.

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Seneca Falls Machine Co., Seneca Falls, N.Y.

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Reciprocating tool grinder performs two jobs in one

Two new models have been added to the line of off-hand tool grinders manufactured by Ex-Cell-O Corp., Detroit. Both are of the double-end, reciproca-

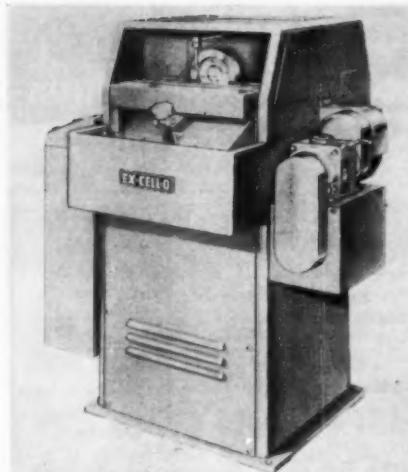
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MACHINE and TOOL BLUE BOOK



Ex-Cell-O grinder—available in two models.

ting type—Style 142 for conventional grinding with vitrified or diamond

wheels and Style 264 equipped with metal-bonded diamond wheels for electrolytic grinding.

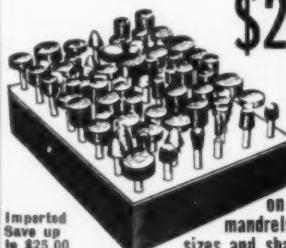
Grinders perform two jobs in one—conventional grinding at one end and chip-breaker grinding at the other. Because of the adjustable, power-controlled reciprocation of the grinding wheels, the operator only need hold the tool at the preset angle. A vertically adjusted table, mounted beneath the reciprocating chip-breaker wheel, accommodates an adjustable tool block fixture which holds the tool in place while grinding the desired angle on the chip-breaker groove.

Other features include variable stroke of 0 to $1\frac{1}{2}$ "; variable reciprocation of 0 to 220 strokes per minute; and an in-built, motorized precision grinding spindle, saddle-mounted to reciprocate along hardened and ground bars.

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Don't Overlook These Features



Tooling at Hupp Aviation. Three examples of how skill and resourcefulness solved problems of machining a cast iron gear housing, tapering involute teeth on a spur gear and the designing of a special fixture to hold a bearing support with flange thickness of only .080" to .100" held within a negative allowance of .002" in parallelism and flatness.

Numerical vs. Tracer Control. Will tracer controlled machines be displaced by numerically controlled machines? A Douglas plant engineer believes the tracer control concept has areas of application where it will compete favorably even with highly developed numerically controlled systems.

Spotwelding machine. The works manager of a Swedish firm tells how they built a spotwelding machine in which the bottom electrode consists of a 55' x 8' copper plate.

Gun drilling efficiency. A Milford, Conn. firm has developed a program of experimental development and research to help customers with their deep hole drilling problems.

Production fastening bottlenecks. Here are three case histories which relate how prominent companies solved their production fastening bottlenecks with screw thread fasteners.

Automated horizontal boring machine. New, 4-spindle numerically controlled boring machine, developed by Barnes Drill Co. and General Electric Co. for GE's jet engine plant, has four spindles programmed to bore 248 holes in casting. It is designed to work on the periphery of cylindrically shaped parts with maximum diameters of 50 inches and heights of 40 inches.

New drawing technique for producing aluminum cans. It is now possible to produce seamless can bodies with a depth up to three times their diameter in a single stroke. Cans can have walls as thin as .005".

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Advertisements acceptable in THE MARKET PLACE include those for employment, sales services, production facilities, representation and related needs. Rates: \$20 per column inch per insertion. Maximum size advertisement accepted in this section is three inches.

Copy should reach us by the first of the month for next month's issue.

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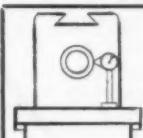
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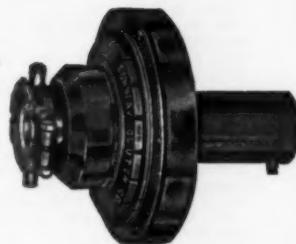
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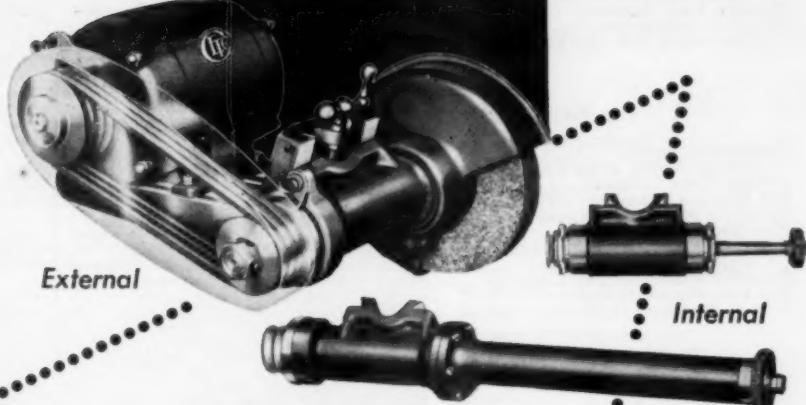
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5	30-32-36-48-50	7/16	12-16-18-22-24-27-28-30-32-36-	1-13/16	16-18-20-24
6	36-40-48-50-60	40	40	8-10-12-14-	8-10-12-14-
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1	58-64-72	7/16	14-20-28	1-7/16	8-10-12-14-16-18-20
2	58-64	1/2	12-13-20-28	1-1/2	6-8-10-12-16-18-20
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6	32-36-40	3/4	10-16-18-20	1-3/4	8-10-12-14-16-18-20
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10	24-30-32-40	7/8	9-12-14-18-20	1-7/8	8-10-12-14-16-18-20
12	24-28-32	1	8-12-14-16-18-20	1-15/16	8-10-12-14-16-18-20
1/4	20-28-32	1-1/8	7-12	2	4½-10-12
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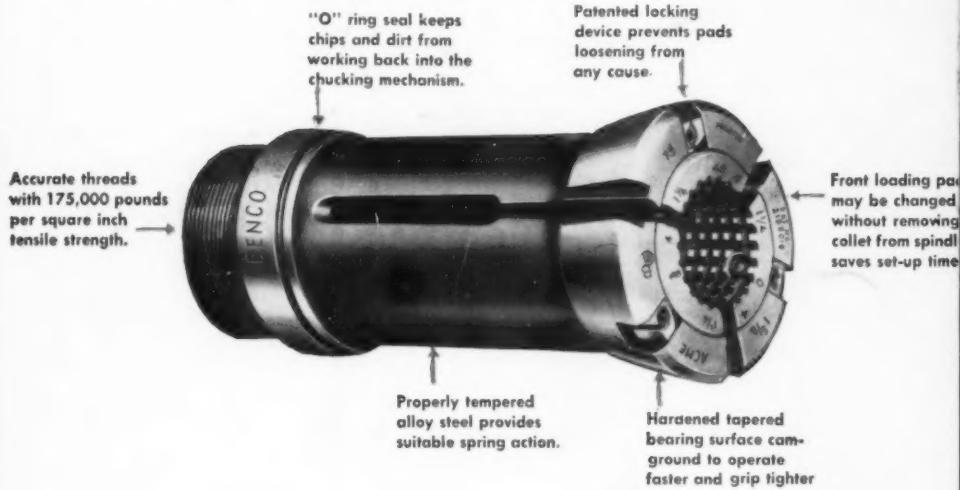


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